LLOYD'S REGISTER
OF
BRITISH AND FOREIGN
SHIPPING

RULES AND REGULATIONS
1883

Lloyd's Register
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834 Catalogue No.:

Rebound 28/08/02

LLOYD'S REGISTER OF BRITISH & FOREIGN SHIPPING.

NOTICE.

RULES 1883-84.

ATTENTION IS DIRECTED TO ALTERATIONS AND AMENDMENTS which have been made in the Rules, as follows, viz.—

WOOD SHIPS.

Sections 8 & 10, on THE SUPERINTENDENCE OF THE AFFAIRS OF THE SOCIETY.
Section 28, on FEES.

IRON SHIPS.

Section 5, on STERN POST, &c.
Section 6, on FRAMES.
Section 8, on REVERSED ANGLE IRONS ON FRAMES.
Section 9, on MIDDLE LINE KEELSONS.
Section 13, on BEAMS.
Section 14, on SPACING OF BEAMS, &c.
Section 15, on PILLARS.
Section 17, on TIE PLATES ON BEAMS.
Section 18, on HOOKS AND CRUTCHES.
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Section 22, on BULKHEADS.
Section 24, on DOUBLE BOTTOMS.
Section 26, on ENGINE SPACE.
Section 36, on RUDDERS.
Section 38, on PUMPS.
Section 39, on EQUIPMENT AND SPARE GEAR.
Section 41, on THREE-DECKED STEAM VESSELS.
Section 42, on SPAR-DECKED STEAM VESSELS.
Section 43, on AWNING DECKED VESSELS.
Section 45, on RAISED QUARTER DECKS.
TABLE G 1, AMENDED.
TABLE G 6, NOW ADDED.—Table of Scantlings for Double Bottoms Constructed on the Cellular System.

STEEL SHIPS.

NOTICE No. 436*—on SHIPS BUILT OF STEEL—See Footnote.

WOOD SHIPS AND COMPOSITE SHIPS.

Sections 78 and 24 respectively, on SPARE GEAR FOR STEAM SHIPS.

FREEBOARD.

For Notices 471* and 472* on Freeboard of Ships, see appendix to the Rules.

For further particulars of alterations in the Rules and of other matters, see Notices and Circulars printed in the appendix to the Rules.

By order of the Committee,

BERNARD WAYMOUTH,
Secretary.

2, *White Lion Court, Cornhill,*
1*st July*, 1883.

LLOYD'S REGISTER OF BRITISH & FOREIGN SHIPPING.

[Established 1834.]

YACHT REGISTER.

1883-84.

NOTICE IS HEREBY GIVEN that this Society's Register of British and Foreign Yachts—for the year 1883-84 was issued on the 1st May.

The book contains, in addition to the Names, Class, and other useful information relating to Yachts classed by the Society, the Names, Dimensions, &c., of all British and Foreign Yachts, the particulars of which are known; also, in an Appendix, a List of the various Yacht Clubs and Illustrations of their respective Flags, an Index of Signal Letters, a List of Yachts which have had Names changed, and an Alphabetical List of the Names and Addresses of Yacht Owners so far as they can be ascertained.

The Society's rules and suggested scantlings for the building of Iron, Wood, and Composite Yachts intended for classification are comprised in the volume.

The terms of Subscription are half a guinea per copy for individuals or firms; and for Yacht Clubs, Marine Assurance Companies, and other public bodies, not less than two guineas per annum, for which two copies of the work will be supplied.

By order of the Committee.

B. WAYMOUTH,
Secretary.

2, *White Lion Court, Cornhill, London, E.C.*
1*st July*, 1883.

SURVEYS required by the Rules, or when repairs are necessary in consequence of damage, or from other causes, rests with the Owners, Masters, or Agents.

By order of the Committee,

BERNARD WAYMOUTH,
Secretary.

No. 2, *White Lion Court, Cornhill, London*, 1*st July*, 1883.

LLOYD'S REGISTER OF BRITISH AND FOREIGN SHIPPING.

ESTABLISHED 1834.

REGISTER BOOK.

THE REGISTER BOOK is published annually on the 1st July. It contains the names, &c., of *all* vessels of 100 tons and upwards registered in the United Kingdom, and of many ships of large tonnage owned abroad.

In the Appendix will be found a list of Owners of Ships recorded in the Register Book, also a list of Dry Docks, Floating Docks, Pontoons, Patent Slipways, &c., at the principal Ports in the World.

A list is also printed in the Appendix of the Members of Lloyd's, and of the Agents to Lloyd's.

The annual subscription of individuals or Firms for the Register Book is £3 3s.

The Register Books in London are (unless otherwise arranged) periodically posted by type, with additions and corrections throughout the year, for which an additional charge of £1 1s. is made.

Supplements are supplied to subscribers in the country and those resident abroad, also for Register Books not posted as above.

From the number of alterations and additions constantly returned to this office, it is necessary that the Register Books should be posted every week; it is therefore requested that Subscribers whose Books are posted, will be particular in sending them to this office for that purpose.

It is particularly requested that subscribers of Posted Books, *leaving town*, will direct their Books to be sent to the office, where they will be kept regularly posted during their absence.

Parties discovering any errors, are requested to communicate the same to the Secretary, in order that immediate notice may be taken thereof.

N.B.—The Subscription is due on the delivery of the Book.

CLASSIFICATION OF SHIPS.

IRON SHIPS are classed by the Society *AA1, AA1, AB1, and AC1, also A1 with a numeral prefixed, thus—100A1, 90A1, and 80A1, and retain their characters so long as, on careful annual surveys and periodical Special Surveys, they are found to be in a fit and efficient condition to carry dry and perishable cargoes to and from all parts of the world.

The Characters 100A1 and 90A1 and 80A1 denote vessels that have been built in accordance with, or equal to the Rules, and Tables G 1, G 2, G 3, G 4, G 5 and G 6 attached to the Rules.

WOOD SHIPS are classed A 1 as a first-class for a term of Years, subject to occasional or annual surveys when practicable, also to *half-time or intermediate* Special Surveys. They are eligible for Continuation or Restoration of the Character A 1 for further periods upon Special Surveys provided in the Rules.

WOOD SHIPS are also classed A 1 in Red.—This also is a Class of Vessels fit for the safe conveyance of dry and perishable goods *to and from all parts of the world*. They are subject to annual survey, and to the half-time survey prescribed in the Rules.

WOOD SHIPS are likewise classed Æ, for the conveyance of dry and perishable goods on *shorter voyages*, and for the conveyance of cargoes *not* in their nature subject to sea damage *on any voyage*. They must be submitted to annual survey, and to Special Survey within periods not exceeding *four* years.

WOOD SHIPS are also classed E, for the conveyance of cargoes not subject to sea damage *on any voyage*. They must be submitted to annual survey, and to Special Survey within periods not exceeding *three* years.

Provision is made in the Rules for the Classification of Composite Ships.

All vessels are required to be surveyed periodically. The *date of Survey* only certifies to their state of efficiency *at that time*.

N.B.—In reference to the Rules above quoted, and in order to prevent the disappointment arising from Ships losing their Characters from want of survey, it is hereby intimated that the duty of giving NOTICE OF PERIODICAL SURVEYS required by the Rules, or when repairs are necessary in consequence of damage, or from other causes, rests with the Owners, Masters, or Agents.

By order of the Committee,

BERNARD WAYMOUTH,
Secretary.

No. 2, White Lion Court, Cornhill,
London, 1st July, 1883.

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London, 1st July, 1883.

LLOYD'S REGISTER

OF

BRITISH AND FOREIGN

SHIPPING.

LLOYD'S REGISTER

OF

BRITISH AND FOREIGN SHIPPING.

FROM 1ST JULY, 1883, TO THE 30TH JUNE, 1884.

OFFICE, 2, WHITE LION COURT, CORNHILL, LONDON.

ESTABLISHED 1834.

The REGISTER,—which is printed solely for the information of Merchants, Shipowners, Underwriters, and others, being Subscribers or Members,—contains, in addition to the names, class, and other useful particulars relating to vessels classed by the Society, the names, dimensions, &c., of *all* vessels of 100 tons and upwards registered in the United Kingdom, and of ships of large tonnage owned abroad, some of which, although not classed by the Society, may be classed elsewhere.

The conditions regulating the classification of vessels in the REGISTER are contained in the Society's Rules.

The KEY to the REGISTER precedes the List of Vessels.

LONDON:
WYMAN AND SONS, PRINTERS, 74 to 76, GREAT QUEEN STREET,
LINCOLN'S-INN FIELDS.

1883.

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COMMITTEE OF MANAGEMENT.

1883-1884.

WILLIAM HENRY TINDALL, Esq., *Chairman.*
MICHAEL WILLS, Esq., *Deputy-Chairman.*
THOMAS B. WALKER, Esq., *Chairman of the Sub-Committees of Classification.*

MEMBERS ELECTED IN LONDON.

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GEORGE LIDGETT, Esq., *Chairman of the General Shipowners' Society.*

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HARTLEPOOL DISTRICT — JOHN HALL, Esq.

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SECRETARY.

BERNARD WAYMOUTH, Esq.

ASSISTANT SECRETARY.

RICHARD GILLESPIE, Esq.

No. 2, White Lion Court, Cornhill
London, 2nd July, 1883.

LIVERPOOL BRANCH.

1883-1884.

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National Provincial Bank of England (*Lim.*)

SECRETARY.

John Frederick Light, Esq.

Office, 12, *Oriel Chambers, Liverpool,*
2nd July, 1883.

SURVEYORS.

THE SURVEYORS AT THE FOLLOWING PORTS ARE EXCLUSIVELY THE OFFICERS OF THE SOCIETY, AND ARE NOT PERMITTED TO ENGAGE IN ANY OTHER BUSINESS OR EMPLOYMENT WHATSOEVER.

LONDON ...	Benjamin Martell, Esq., *Chief Surveyor.*	William C. Davey.
	Harry J. Cornish, Thomas Edwards, *Assistants to Chief Surveyor.*	Senhouse Martindale. John W. Miles. James H. Truscott. Thomas C. Read. Philip Jenkins.
	William Parker, Esq., *Chief Engineer Surveyor.*	Edward C. Champness. Thomas S. Warren.
	James T. Milton, David Purves, *Assistants to Chief Engineer Surveyor.*	J. T. Roberts. G. Mares. H. Hand.
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BANGOR, *with Carnarvon and Holyhead* (*Office*, 5, *Glan Dwr Terrace*) ...		Thomas Devonald.
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Engineer Surveyor for the Dundee and Aberdeen Districts (*Office*, 62, *Dock Street, Dundee*)		John Sturrock.
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SURVEYORS—*continued.*

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SURVEYORS—*continued.*

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SUNDERLAND *and Seaham* (*Office*, 56, *John Street, Sunderland*)	Richard J. Reed. Joseph Keen. Thomas Shilston. William Bath. Jesse Williams. William Johnstone.
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THE SURVEYORS AT THE FOLLOWING PORTS DO NOT HOLD APPOINTMENTS AS THE EXCLUSIVE SERVANTS OF THE SOCIETY.

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SLIGO	William Pollexfen.
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Nantes (*Surveyors' address*, 8, *Rue de l'Héronnière*)	Auguste L. Guibert. Auguste Barreau.

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Engineer Surveyor for Bergen	E. Hougland.

Sweden.

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Engineer Surveyor for Trieste District	Frederic Schnabl.
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Ditto at Venice	Matteo Fabro.
Ditto at Lussino	Antonio E. Tarrabocchia.

MALTA.

MALTA	*Ship and Engineer Surveyor*	W. Hinchcliffe.

BRITISH NORTH AMERICA.

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QUEBEC *and the River St. Lawrence*	John Dick.
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UNITED STATES.

NEW YORK, *Principal Surveyor for the United States, and Exclusive Surveyor for the Port and District of New York* (*Office*, 62, *Wall Street, New York*)	Thomas Congdon.
BALTIMORE (*Office*, 66, *South Gay Street*)	Edward H. Sanford.
Engineer Surveyor for Baltimore	Richard Wells.
BOSTON (*Office*, 24, *White Street, East Boston*) *Ship and Engineer Surveyor*	Oliver L. Shaw.
PHILADELPHIA (*Office*, 206, *Walnut Place*) ... *Ship and Engineer Surveyor*	John Haug.

SOUTH AFRICA.

CAPE TOWN	James Anderson.
PORT NATAL	Alexander Airth.

EAST INDIES.

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Engineer Surveyor for Singapore	E. C. Billows.

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SOURABAYA	F. H. Popken.

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CHINA.

AMOY	L. A. Andersen.
HONG KONG	Edward Burnie.
SHANGHAI, *and adjacent Ports*	

AUSTRALIA, TASMANIA, AND NEW ZEALAND.

ADELAIDE	William Begg.
MELBOURNE	Douglas Elder.
SYDNEY, *New South Wales* (*Office*, 20, *Loftus Street, Sydney*)	Robert F. Pockley.
BRISBANE	William B. Brown.
HOBART (Tasmania)	Donald Macmillan.
AUCKLAND, N.Z.	M. T. Clayton.
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DUNEDIN, N.Z.	James Ure Russell.
WELLINTGON, N.Z.	William Bendall.

ENGINEER SURVEYORS TO THIS SOCIETY, WITH THE DISTRICTS ASSIGNED TO THEM.

Those marked with an Asterisk (*) are not exclusively the Officers of the Society.

	Districts.		Letters to be addressed to
London.			
WILLIAM PARKER JAMES T. MILTON DAVID PURVES GEORGE E. WILKINSON CHARLES E. STROMEYER	London Southampton	and intermediate Ports.	*The Secretary,* *Lloyd's Register of Shipping,* 2, *White Lion Court,* *Cornhill.*
Liverpool.			
JOHN GEORGE KINGHORN J. E. STODDART	Liverpool Carnarvon Dublin	ditto.	*The Secretary,* *Lloyd's Register of Shipping,* *Oriel Chambers,* *Liverpool.*
Barrow.			
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JAMES MOLLISON PETER MCGREGOR W. E. ROBSON G. L. HINDMARSH ANDREW C. HERON JOHN SANDERSON	Glasgow Greenock	ditto.	*The Surveyors,* *Lloyd's Register of Shipping,* 36, *Oswald Street, Glasgow, or* *Union Bank Building,* 2, *Church Place,* *Greenock.*
Dundee.			
JOHN STURROCK	Dundee Aberdeen	ditto.	*The Surveyors,* *Lloyd's Register of Shipping,* 62, *Dock Street,* *Dundee.*
Leith.			
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*RICHARD WELLS	Baltimore	*The Surveyors, Lloyd's Register of Shipping, 66, South Gay Street, Baltimore.*
Boston.		
*OLIVER L. SHAW	Boston	*The Surveyor, Lloyd's Register of Shipping, 24, White Street, East Boston.*

STATEMENT, SHOWING THE NUMBER, GROSS TONNAGE,

IRON and STEEL STEAMERS, CLASSED.

	BRITISH.		COLONIAL.		FOREIGN.	
Class.	Number	Tonnage.	Number	Tonnage.	Number	Tonnage.
*A	21	19,167	..	..	5	7,406
A	50	33,222	1	1,257	10	5,812
B	86	64,165	2	1,009	31	25,515
C	33	21,140	1	174	5	2,857
A	19	8,803	3	741	10	5,955
100A	1754	2,808,736	60	61,949	438	733,507
95A	15	11,749	..	..	5	4,642
90A	480	403,461	28	16,849	163	138,093
85A	10	7,274	..	..	..	..
80A	24	19,565	..	..	7	4,128
75A	2	1,422	..	..	1	130
—	2494	3,368,704	95	81,979	675	928,045

3264 Classed Iron and Steel Steamers..... **4,378,728** Tons.

IRON and STEEL SAILING SHIPS, CLASSED.

	BRITISH.		COLONIAL.		FOREIGN.	
Class.	Number	Tonnage.	Number	Tonnage.	Number	Tonnage.
*A	549	534,943	18	14,212	49	32,133
A	14	13,807	6	2,406	8	3,553
B	6	4,307	1	420	..	..
C	2	2,400	..	..	..	..
A	2	2,812	..	..	1	698
100A	825	1,006,977	22	21,605	44	38,834
95A	1	403	..	..	3	1,761
90A	3	1,606	3	582	3	2,161
85A	..	..	1	789	..	..
80A	1	54	..	..	..	..
—	1403	1,567,309	51	40,014	63	79,140

1517 Classed Iron and Steel Sailing Ships..... **1,686,463** Tons.

IRON and STEEL STEAMERS, DIS-CLASSED.

BRITISH.		COLONIAL.		FOREIGN.	
Number.	Tonnage.	Number.	Tonnage.	Number.	Tonnage.
288	249,989	39	20,094	233	225,433

560 Iron and Steel Steamers, Dis-Classed..... **495,516** Tons.

IRON SAILING SHIPS, DIS-CLASSED.

BRITISH.		COLONIAL.		FOREIGN.	
Number.	Tonnage.	Number.	Tonnage.	Number.	Tonnage.
31	25,299	8	2,576	13	8,778

52 Iron Sailing Ships, Dis-Classed ..... **36,653** Tons.

IRON and STEEL STEAMERS, NEVER CLASSED.

1534	1,716,612	47	27,921	289	465,807

1,870 Iron and Steel Steamers, Never Classed..... **2,210,340** Tons.

IRON and STEEL SAILING SHIPS, NEVER CLASSED.

87	61,389	3	2,404	31	26,431

121 Iron and Steel Sailing Ships, Never Classed..... **90,224** Tons.

WOOD (INCLUDING COMPOSITE) VESSELS, CLASSED.

Class.	BRITISH. Number.	BRITISH. Tonnage.	COLONIAL. Number.	COLONIAL. Tonnage.	FOREIGN. Number.	FOREIGN. Tonnage.
23 A	1	625	..	....	..	....
22 A	1	468	..	....	..	....
20 A	4	4,801	..	....	..	....
19 A	49	38,357	2	650	..	....
18 A	45	34,515	1	250	3	1,265
17 A	21	15,937	1	326	1	892
16 A	55	31,815	4	1,355	4	3,091
15 A	85	46,804	5	1,778	12	8,270
14 A	105	42,942	5	2,264	5	2,257
13 A	181	51,043	9	3,409	31	14,594
12 A	497	107,436	14	3,337	69	39,039
11 A	299	67,895	13	5,177	60	42,096
10 A	315	73,483	47	27,490	44	26,356
9 A	323	76,394	113	65,393	50	22,142
8 A	48	7,924	15	5,842	14	3,748
7 A	23	5,613	11	3,125	1	213
6 A	7	1,300	2	1,288	1	888
5 A	7	648	2	376	..	....
4 A	5	388	..	....	5	1,205
A	268	55,141	12	6,668	40	19,887
Æ	119	32,203	3	1,065	10	3,904
F	..	....	..	....	1	722
	2,458	695,732	259	129,793	351	190,569

3,068 Classed Wood Vessels ..... **1,016,094** Tons.

WOOD VESSELS, DIS-CLASSED.

BRITISH. Number.	BRITISH. Tonnage.	COLONIAL. Number.	COLONIAL. Tonnage.	FOREIGN. Number.	FOREIGN. Tonnage.
2,155	592,366	207	86,259	420	223,892

2,782 Dis-Classed Wood Vessels ... **902,517** Tons.

WOOD VESSELS, NEVER CLASSED.

BRITISH. Number.	BRITISH. Tonnage.	COLONIAL. Number.	COLONIAL. Tonnage.	FOREIGN. Number.	FOREIGN. Tonnage.
763	358,962	23	17,356	722	527,737

1,508 Wood Vessels, Never Classed ..... **904,055** Tons.

	Number.	Tons.
Iron and Steel Steamers, Classed	3,264	4,378,728
,, ,, Dis-Classed	560	495,516
,, ,, Never Classed	1,870	2,210,340
	5,694	7,084,584

	Number.	Tons.
Iron and Steel Sailing Ships, Classed	1517	1,686,463
Iron Sailing Ships Dis-Classed	52	36,653
,, and Steel ,, Never Classed ...	121	90,224
	1,690	1,813,340

	Number.	Tons.
Wood Vessels, Classed.....	3,068	1,016,094
,, Dis-Classed.....	2,782	902,517
,, Never Classed.....	1,508	904,055
	7,358	2,822,666

TOTAL SHIPS... ... ... **14,742**

TOTAL TONNAGE **11,720,590**

NOTE.—*In the Register Book are inserted the names and tonnage of all Vessels belonging to the United Kingdom over* 100 *tons register, whether Classed or not. Those under* 100 *tons which appear in the Book are either now or have been previously Classed.*

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LLOYD'S REGISTER

OF

BRITISH AND FOREIGN SHIPPING.

RULES AND REGULATIONS.

Section 1. THE operations of the Societies of the two Register Books of Shipping formerly printed for the use of Merchants, Ship Owners, and Underwriters, having ceased in the year 1834, this Society was then established for the purpose of obtaining a faithful and accurate Classification of the Mercantile Shipping of the United Kingdom, and of the Foreign Vessels trading thereto, and for the government of which the following Rules and Regulations have been from time to time adopted.

Section 2. A Register Book to be printed annually for the use of Subscribers, containing the names of the Ships with other useful information, and the Character assigned, where the vessels are classed by the Society; also the names, &c., of all Ships of 100 tons and upwards registered in the United Kingdom, although unclassed by this Society, and of Ships of large tonnage owned abroad.

Section 3. Each person subscribing the sum of Three Guineas per annum (or such other sum as the General Committee may fix) to be considered a Member of the Society, and entitled *for his own use* to one copy of the Register Book.

Section 4. The subscription of Public Companies, or Public Establishments (not being engaged in Marine Insurance), to be Ten Guineas per Annum.

Section 5. The subscription of Marine Insurance Companies to be regulated by the Committee on special application, in each case, but not to be less than Ten Guineas per Annum.

Section 6. The Register Books supplied to Subscribers in London will be (unless otherwise arranged) periodically posted by type, with additions and corrections throughout the year. But in the case of the Books supplied on a Subscription of £3. 3s. per annum, thus posted, a charge of One Guinea per annum will be made in addition, for posting, making the Subscription £4. 4s. per annum.

Section 7. For the convenience of Subscribers not resident in London, or whose Register Books are not posted, a Supplement, containing the additions to, and corrections made in, the Register Book, to be printed, fortnightly, in such convenient form, as to admit of its transmission by Post, so that such parties may be furnished, from time to time, with the latest and most complete information.

Section 8. The superintendence of the affairs of the Society to be under the direction of a Committee of Merchants, Shipowners, and Underwriters: twenty-four elected in London and twenty-four at the principal Outports, and in addition, the Chairman for managing the affairs of Lloyd's, and the Chairman of the General Shipowners' Society, for the time being, to be, *ex officio*, Members of the Committee, but any member (except an ex-officio member) who fails to attend any meetings of the Committee for a period of six continuous months, without leave of absence, shall cease to be a member, and his place shall be filled up in the usual way.

The General Committee reserve the right of varying or withdrawing the representation of Outports, as well as the mode of election of Members.

Section 9. Six of the Members elected in London, namely, two of each of the constituent parts of the Committee, to go out annually by rotation, but to be eligible to be re-elected. The vacancies so arising to be filled up by the election of two Underwriters and one Merchant by the Committee of Lloyd's, and two Shipowners and one Merchant by the Committee of the General Shipowners' Society.

Section 10. Of the Members elected at the Outports twenty are to retire at the end of every *four* years, and four of the Members elected at Liverpool are to retire annually. The retiring Members are eligible for re-election.

Section 11. The Committee to appoint from their own body, annually, a Chairman and Deputy-Chairman, and also a Chairman for a Sub-Committee of Classification.

Section 12. The Committee to appoint a Sub-Committee of Classification, to be so regulated that each Member of the General Committee may, in rotation, take his turn of duty therein throughout the year.

Section 13. The Secretary, Clerks, and Servants of the Society, and the Surveyors, to be appointed by and be under the direction of the General Committee.

Section 14. Special meetings to be convened by order of the Chairman, or Deputy-Chairman, or on the requisition of any three Members.

Section 15. All elections and appointments to be made by ballot.

Section 16. No Member of the Committee to be permitted to be present on the decision of the classification of any ship of which he is the owner, or wherein he is directly or indirectly interested.

Section 17. The Committee to be empowered to make such By-laws for their own government and proceedings as they may deem requisite, not being inconsistent with the original Rules and Regulations under which the Society was established; but no new Rule or By-law to be introduced, nor any Rule or By-law altered, without special notice being given for that purpose at the Meeting of the Committee next preceding that at which such Motion is intended to be made; such notice to be inserted in the summons convening the meeting.

No new Rule, or alteration in any existing Rule, materially affecting the classification of ships, to take effect until the expiration of six months from the time it shall have been determined upon.

Section 18. All Reports of survey to be made in writing by the Surveyors according to the form prescribed, and submitted for the consideration of the General Committee, or of the Sub-Committees of Classification; but the Character assigned by the latter to be subject to confirmation by the General Committee.

Section 19. The reports of the Surveyors, and all documents and proceedings relating to the classification of ships, to be carefully preserved, and parties proving themselves to be interested therein to have access to the same under the direction of the Chairman or Deputy-Chairman.

Copies of the original reports (if the ships be already classed, but not otherwise), so far as relates to the dimensions, scantlings, fastenings, and materials, in cases where the correctness of the reports in these particulars is certified by the builders, are granted on application.

Section 20. Foreign ships, and ships built in the British possessions abroad where there is not a Surveyor (*see also* Section 52), to be surveyed on their arrival at a port to which a Surveyor has been appointed; but a due regard is to be had to the circumstance of such vessels having been exempted from supervision while building, and the Character to be assigned to them is to be regulated according to their intrinsic quality and from the best information the Committee can obtain.

Section 21. In every case in which the Character assigned to a ship may be proposed, on survey, to be reduced, notice is to be given in writing to the Owner, Master, or Agent, with an intimation that if the reduction be objected to, the Committee will be ready to direct a special survey, on the Owner, Master, or Agent agreeing to pay the expenses attending the same, provided on the said survey there shall appear sufficient ground for the proposed reduction.

Section 22. When the Surveyors consider repairs to be requisite, they are respectfully to communicate the same in writing to the Owner, Master, or Agent, and if such repairs be not entered upon within a reasonable time, a corresponding report is to be made, as soon as possible, to the Committee for their decision thereon.

All repairs of Ships or Machinery required at Ports where there is a Surveyor to this Society, in order to their obtaining a Character in the Register Book, or to their retaining the Characters assigned to them therein, must be carried out under the inspection, and to the satisfaction of the Society's Surveyors. Ships repaired at Ports where there is no Surveyor to this Society, must be surveyed by one of the Society's Surveyors at the earliest opportunity.

Section 23. Parties considering the repairs suggested by the Surveyor to be unnecessary or unreasonable may appeal to the Committee, who will direct a special survey to be held; but should the opinion of the Surveyor be confirmed by the Committee, then the expense of such special survey is to be paid by the party appealing.

Section 24. The Surveyors to the Society not to be permitted (without the especial sanction of the Committee), to receive any fee, gratuity, or reward whatsoever for their own use or benefit, for any service performed by them in their capacity of Surveyors to this Society, on pain of immediate dismissal.

Section 25. The Surveyors will be directed to attend on Special Surveys of ships or machinery while building or under damage or repair, when required by Merchants, Shipowners, or Underwriters; the charge for which is to be regulated according to the nature and extent of the service performed. In all cases, the application for the assistance of the Surveyors must be made in writing addressed to the Secretary.

FUNDS.

Section 26. The Funds to be under the authority and control of the Committee, and a statement of the Receipts and Expenditure to be annually printed for the information of the subscribers.

Section 27. The following Fees to be charged to the Owners of ships prior to their vessels being classed and registered in the book:—

I.

CLASSING FEES.

For First Entry of Class in the Register Book, or for Recording Continuation or Restoration, or A in Red, or Special Survey No. 3.

For each Ship under 200 Tons	...	...	...	...	£1 0 0
Ditto of 200 and under 500 Tons	...	...	...		2 0 0
Ditto of 500 „ 1,000 „	...	...	...		3 0 0
Ditto of 1,000 „ 2,000 „	...	...	...		4 0 0
Ditto of 2,000 and upwards	...	...	...		5 0 0

For First Entry of the Notification "L.M.C." *in the Register Book.*

For each Ship under 100 registered HP.	...	...	...		£1 0 0
Ditto of 100 and under 300 HP.	...	...	...		2 0 0
Ditto of 300 and above	...	...	...		3 0 0

II.

OFFICE OR REGISTRATION FEES.

Chargeable on Vessels surveyed, for other than First Entry, &c., under the above Scale I., by the Society's Non-Exclusive Surveyors.

For each Ship under 500 Tons	...	...	...	...	£0 10 0
Ditto of 500 and under 1,000 Tons	...	...	...		1 0 0
Ditto of 1,000 „ 2,000 „	...	...	...		1 10 0
Ditto of 2,000 and upwards	...	...	...		2 0 0

SPECIAL SURVEYS.

Section 28. For ships built under the special superintendence of the Surveyors (to entitle them to the distinctive mark ✠), 1s. per ton for the first 1,000 tons, and 6d. per ton for every ton beyond 1,000 tons.

For machinery or new boilers built under the special superintendence of the Surveyors (to entitle them to the distinctive mark ✠ in red).

For engines and boilers up to 200 registered horse-power, 3 shillings per horse-power. For engines over 200 horse-power, 3 shillings for the first 200 horse-power, and 1 shilling per horse-power above 200. No fee to be less than £8. 0s. 0d.

For the survey and testing of Donkey Boilers, a fee of two guineas to be charged.

For Surveys for damage, or for other Surveys, held at the request of the Owners, and for the Survey of Ships for Restoration, Continuation, or the character A in Red, or otherwise under the Society's rules, a charge (in addition to the Fee for entry) will be made, according to the nature and extent of the service performed.

In cases where the caulking of ships is superintended and tested by the Surveyors, a special charge will be made, according to the tonnage of the ship.

All repairs which may be required on the Surveys above referred to, must be performed under the superintendence of the Society's Surveyors. (*See also* Section 22.)

MEM.—It is to be understood that in all cases where travelling expenses are incurred by the Surveyors in connection with the above services, they are to be defrayed by the parties interested in the same.

Section 29. Certificates of Character, on the Form No. 7, *or* of "L.M.C.," *or* "B.&M.S.," on Forms Nos. 10 or 11, signed by the Chairman, the Deputy-Chairman, or the Chairman of the Sub-Committee of Classification, and countersigned by the Secretary, will be granted on application, the charge for which will be as follows:—

For Characters of Ships under 200 Tons	...	...	£0	2	6	each
Ditto of 200 „ and above	...	...	0	5	0	„
For L.M.C. or B.&M.S. of vessels under 150 HP.	...	...	0	2	6	„
Ditto Ditto of 150 HP. and above	...	...	0	5	0	„
Copies of original reports, as per Section 19	...	...	1	1	0	„

Section 30. Rules, complete, 10s. each copy. If for Wood Ships and Composite Ships alone, 5s. If for Iron Ships alone, 5s.

CHARACTERS.

Section 31. The Characters assigned to ships to be, as nearly as possible, a correct indication of their real and intrinsic qualities,* and to be in all cases fixed (not by the Surveyors, but) by the Committee, after due consideration of the reports of the Surveyors, and such other documents as may be submitted to them, and will be distinguished as follows :—

SHIPS CLASSED A.

To consist of new ships, or ships Continued, or Restored. (*Vide* Sections 34, and 54 to 59.)

SHIPS CLASSED A, in Red.

To consist of ships which have passed the period assigned on the original Survey, or Continuation, or Restoration, and of ships not having had an original character, provided they are found on survey of superior description, fit for the conveyance of dry and perishable goods, *to and from all parts of the world.* (*Vide* Section 60.)

SHIPS CLASSED Æ.

To consist of ships which are found on Survey fit for the safe conveyance of dry and perishable goods on *shorter voyages*, and for the conveyance of cargoes not in their nature subject to sea damage on *any voyage.* (*Vide* Section 61.)

SHIPS CLASSED E.

Will comprise ships which shall be found on Survey fit for the conveyance of cargoes not in their nature subject to sea damage *on any voyage.* (*Vide* Section 64.)

FOREIGN BUILT SHIPS CLASSED F. †

Foreign Built Ships which have not been constructed in accordance with the Rules, and have not been surveyed by the Surveyors to this Society while building, have, upon survey, been assigned one of the two following designations of condition or character, thus, **1 F**,—**2 F**, if found eligible thereto. (*See* Section 83.)

It is to be distinctly understood that the following characters are confined in their application to *Foreign Built Ships.*

SHIPS CLASSED 1 F.

1 F denotes ships which have been found on survey to be of a superior description, fit for the conveyance of dry and perishable goods to and from all parts of the world.

SHIPS CLASSED 2 F.

2 F denotes ships which, although not equal to the foregoing, have nevertheless been found on survey to be in a good and efficient condition, and fit for the conveyance of dry and perishable goods, on shorter voyages.

* Ships which are not built in accordance with the principles of the Society's Rules will be marked in the Register Book thus "[*Expl. B.S.*]," denoting that they are built experimentally, and are classed subject to being surveyed biennially.

† Mem. 1st July, 1876 :—*The Character* **F** *will not in future be assigned in the Classification of Ships. Those Ships, however, which have already been assigned this Character will be allowed to retain the same upon Periodical Survey in accordance with the requirements of Section* 83 *of the Rules. Owners of Ships so classed are, at the same time, invited to submit their Vessels for Classification with some other Character provided for in the Rules.*

EQUIPMENT.

To entitle sailing ships to the Figure 1 for equipment, Sections 72 to 76 must be conformed to, and stores supplied in accordance with Table 22, attached to the Rules.

For steam vessels *see* Sections 76 to 78, 81, and 82.

EXPUNGING OR WITHDRAWAL OF CHARACTER.

The twelfth, thirteenth, and fourteenth Columns of the page of the Register Book left blank, indicate that the Vessel has never been Classed in the Register Book. Three dots (...) in Column 13 indicate that the Vessel was at one time Classed by this Society, but that the Class has been withdrawn at Owner's request. A black line with date under it in Column 14 indicates that, at that date, the Vessel from reported defects, was not entitled to a Character in the Register Book. A red line with date under it in this Column indicates that the Class was withdrawn from non-compliance, at that date, with the Society's Rules.

TONNAGE FOR REGULATING THE SCANTLINGS AND EQUIPMENT (AS REGARDS ANCHORS, CHAINS, &c.) OF WOOD VESSELS.

Section 32. In flush-decked vessels having either one, two, or three decks (not being spar or awning-decked), the tonnage under the upper deck, *without abatement of the tonnage of the space for the crew, or for the propelling power of steam vessels,* is to regulate all the scantlings of the hull, and also the equipment of the vessel, as regards anchors, chains, warps, &c.

In vessels having a *raised quarter deck,* or a poop, or top-gallant forecastle, or deck houses, or awning deck, or spar deck, the total tonnage below the tonnage deck is to regulate the scantlings of the hull, but the register tonnage, as cut on the main beam of sailing vessels and of steam vessels, *with the addition of the tonnage of the space required for propelling power,* is to regulate the equipment.

But in vessels where the tonnage of the erections above the tonnage deck is less than that allowed for crew space, *then* the *difference* between the tonnage of these erections and the tonnage of the space allowed for crew is to be *added* to the register tonnage, cut on the main beam, for the tonnage that is to regulate the equipment.

RULES FOR CLASSIFICATION.

SHIPS CLASSED A.

Section 33. Will consist of new ships, and ships which have not passed a prescribed age, and also those which have a Continuation or Restoration of that character, provided they are kept in a state of complete repair and efficiency.

The Character A will not be granted to any vessel, unless satisfactory evidence of the date, build, and place where built, is produced. (*See* Section 59, *foot-note.*)

Section 34. The number of years to be assigned for Character A is to be determined with reference to the original construction and quality of the vessels, the materials employed, and the mode of

building; and their continuance for the time so assigned to depend upon its being shown by occasional surveys (annually, if practicable) that their efficiency is duly maintained. (*See* N.B. at foot.)

Defects in workmanship or quality of timber will involve a reduction of class, to be determined by the Committee in each case.

HALF-TIME OR INTERMEDIATE SURVEY.*

The Characters of ships classed A, or A in Red, will be struck out of the Register Book unless they be submitted to the following intermediate survey, within periods not exceeding four years in the case of vessels classed from six to eight years inclusive, either originally, or on Continuation, or on Restoration, or A in Red, and within periods not exceeding half that assigned in vessels classed for longer terms. Vessels classed for a less period than the above will not be required to undergo such half-time survey.

The survey will be noted in the Register Book thus,—"H. T." (half-time), with the date of the survey affixed.

SURVEY.

The ship to be placed on blocks in dry dock, or on ways, so that the keel and bottom may be seen and properly examined (unless she has been thus surveyed by the Society's officers within the previous twelve months); the hold to be cleared, and proper stages made both inside and outside; the limbers, and all air courses to be cleared; and if the ship has not already got the air courses, described in Section 37 of the Rules, they are now to be made; the outside planking to be scraped bright where the Surveyors may consider it to be necessary from any apparent defect; bolts of lower deck (if of iron) in number not less than six on each side, and treenails in number not less than twelve on each side, to be driven out at various parts of the ship.

The attention of the Surveyors is to be then particularly directed to the state of the upper or main deck and comings, the upper and lower deck bolts, *whether of iron or copper*, and the outside planks through which they pass, and to all other parts of the ship, so far as they can be examined.

All yellow metal bolts to be tested where practicable, to ascertain if any are broken.

The windlass to be unhung and its wood lining sufficiently stripped for examination; the condition of the caulking is also to be ascertained.

The cables to be removed from the lockers and ranged, and, with the anchors, masts, spars, and general equipment, examined so as to be satisfactorily reported upon.

In the case of vessels allowed an additional year in classing for salting under Section 37, the state of the salting throughout such vessels is to be ascertained and reported upon at the Half-time Survey, and, if necessary, the salt is to be renewed.

SHIPS BUILT WITH MIXED TIMBER MATERIALS.

Ships built with Mixed Timber Materials below the fourteen years' grade, of superior workmanship, and in which *high* class materials and extra fastenings have been judiciously employed to such an extent as to

* For Composite Ships, *see* Section 43 of the Rules for Composite Ships.

N.B.—In reference to the Rules above quoted, and in order to prevent the disappointment arising from Ships losing their Characters from want of survey, it is hereby intimated that the duty of giving NOTICE OF PERIODICAL SURVEYS *required by the Rules, or when repairs are necessary in consequence of damage, or from other causes, rests with the Owners, Masters, or Agents.*

satisfy the Committee, may be allowed a period of original designation exceeding that to which the material of the lowest class used would otherwise entitle them, such additional period not to exceed two years.

Builders seeking this advantage must, in the first instance, submit, for the Committee's approval, a drawing of the midship section, with full details of construction and of the proposed materials and scantlings, through the resident Surveyor, who is to state to the Committee his opinion thereon, and the ship must be built under special survey.

No Vessel already built, however, can have the advantage of the above rule, except a Special Survey be held on her to determine her claims thereto.

The highest (unless of a very limited quantity) and the lowest grade timber materials used in the construction of such Ships will be inserted in the Register Book.

See Sections 57 *and* 58 *as regards application of this Rule to ships surveyed for Restoration.*

SURVEYS WHILE BUILDING.

SPECIAL SURVEY.*

Section 35. The Surveyors are to examine, during the progress of a vessel, the materials and workmanship, from the laying of the keel to her completion; and to point out as early as possible anything that may be objectionable.

In Steam Vessels built under Special Survey, the Machinery and Boilers must also be constructed under Special Survey.

NOT UNDER SPECIAL SURVEY.

New ships not building under Special Survey are to be surveyed by the Surveyors to this Society, in the following three stages of their progress, or they will be liable to lose one year of the period to which they might otherwise be entitled. (*See* Section 53.)

First.—When the Frame is completed, timbers dubbed fair inside and outside ready to receive planking and before any planking is wrought.

Second.—When the Beams are put in, but before the Decks are laid, and with at least two strakes of the plank of the ceiling between the lower deck and the bilge unwrought, to admit of an examination of the inner surface of the plank of the bottom.

Third.—When the Hull is completed, and before the plank is painted or payed.

All Ships for which a higher character than Ten Years A may be claimed, must be surveyed by an exclusive Officer of the Society, twice at least while building; namely, at the first and at the second stages of their progress as above prescribed. Due notice must be given by the Builder or Owner of their being ready for these surveys.

Section 36. A full statement, of the dimensions, scantlings, &c., of all New Ships, verified by the Builder, is to be transmitted by the Surveyor, on a Form similar to No. 1 (*vide* page 153), which is to be kept as a record in the office of the Society,

* This will entitle the ship to the distinctive mark ✠.

RULES TO BE OBSERVED IN BUILDING SHIPS.

Section 37. The whole of the timber is to be of good quality and properly seasoned, of the descriptions shown in Table A, as applicable to the several terms of years for which ships may respectively be appointed to remain on the Character A.

In ships claiming to stand twelve or fourteen years from their timber materials, the stem, sternpost, beams, transoms, apron, knightheads, and keelsons, are to be entirely free from sap and from all defects. The rest of the frame to be well squared and free from sap.

SALTING.

One year for salting will be added to the term of classification to which a ship may otherwise be entitled, provided that *during her construction* the openings between the timbers of the frame, at the extremities of the vessel, from the deadwood to the height of the air-courses formed midway between the keelson and the hold beam clamps, and also the buttocks, be filled with salt, and the spaces between the upper air-course and the gunwale be filled before the planksheer is fitted; and that, *within six months of the date of launching*, the salting be completed so as to fill the spaces between the transoms and between the timbers of the frame at each end of the vessel for one-fifth her length, from the deadwood to the gunwale, and amidships from the upper part of the bilges to the gunwale, to the entire satisfaction of the Surveyor. For the purpose of retaining the salt between the timbers, stops are to be introduced immediately above all the air-courses and at the upper part of the bilges.

The keelson is also to be cased in and salted all fore and aft, excepting in vessels of 200 tons and under, when it will only be required to be cased in and salted for one-fifth of the vessel's length at each end.

In the case, however, of vessels entitled in other respects, from their wood materials, to a class not higher than 10 A, where the keelson is composed of *materials named in lines Nos.* 1 *and* 2 of Table A, it will not be necessary to salt the keelson, except at the ends.

The beams on which the weather-deck is to be laid, if salted, are to have a groove gouged on their upper side, except at their extreme ends; the groove to be in width not less than one-fourth the siding of the beam, and one inch in depth, and to be filled with salt as the deck is being laid; but, if not so salted, the beams, *when of wood of the nine years' grade and under*, of all ships to which a year has been or may be granted for "Salting" must, on the occasion of Half-time Survey, be exposed for examination by the removal of deck planking to the extent of one strake all fore and aft at each side of the ship, or to the satisfaction of the Surveyor.*

The state of the salting throughout such vessels is to be ascertained and reported upon at the Half-time and other Special Surveys, and, if necessary, the salt is to be renewed.

Mem.—The foregoing Rule is not to apply to ships built entirely of Teak.

For application of this Rule in repair of ships under the Second Rule for Restoration, see Sections 57 *and* 58.†

* In cases where the beams have not been salted as above prescribed, the notation of † will be added to the record in the Register Book—thus, *Salted.*†

† In cases of ships undergoing large repairs (or in other cases), and where ships have not been salted during construction, provided they are opened out to such an extent that the above requirements can be satisfactorily complied with, special application may be made to the Committee, with a view to having the additional year for salting granted.

WORKMANSHIP.

The workmanship in vessels is to be well executed, and equally so for all grades.

Each set of timbers to be frame-bolted together throughout their entire length; the butts of the timbers to be close, and not to be less than one-third of the entire moulding at that place.

In *all* ships building for classification, where the heads and heels are not full moulded, the timbers are to be well cross-chocked with a proper butt at each end of the chock, each arm to be not less in length than once and a half the moulding of the timbers they connect; in all cases the chocks are to be of a description of wood equal to the best material required by the Rules for the timbers which they unite, excepting the floor-head chocks, which may be of the materials allowed by the Rules for first futtocks.

Where the timbers are scarphed, the scarphs to be of proper length and with a butt at each end, and, in cases where the heads and heels of the timbers which come together are full moulded, a dowel (to be of the diameter from one-fourth to one-third of the moulding of the timber) must be introduced into the ends of such timbers in order to connect them; in the case, however, of vessels of 150 tons and under, provided the heads and heels of the frame timbers be otherwise properly secured to each other, dowels may be dispensed with.

AIR-COURSES.

In all ships an air-course must be left all fore and aft either immediately below, or one strake below, the clamps of each tier of beams; and, in addition, one or two tiers of air-courses must be left in the hold, between the keelson and hold beam clamp, for one-fifth the entire length of the ship at each end.

POOPS AND FORECASTLES.

Section 38. In the construction of top-gallant forecastles, and poops, the timbers must be of the same materials as are required by Table A for the top-timbers of the frames of ships according to the several terms of years appointed for such ships to remain on the Character A, all the said timbers to extend to the plank sheer.

All the outside planking of top-gallant forecastles, and the sheerstrakes, plank sheers, and spirketting of top-gallant forecastles and poops must be of the materials required by Table A for the topsides of the ship; and the shelf and clamps of poops and top-gallant forecastles may be of the same quality as those allowed in Table A for the shelf and clamp of the upper deck.

All the beams of top-gallant forecastles, and the mast beams, breast beams, and transom beams of poops, to be of the materials required by Table A for the beams of the ship; the remainder of the beams and the waterway of the poops, and the remainder of the planking of poops and top-gallant forecastles may be of cedar, mahogany, Baltic or American red pine, pitch pine, larch, hackmatack, tamarac, or cowdie, and rock-elm for such remainder of beams only, and yellow pine or American white spruce in ships below the seven years' grade.

In the inside and outside planking, waterways, plank sheers, and flat of deck of full poops* and top-gallant forecastles, a reduction of *one-fourth* from the thickness required by the Table B for such planks in the

* Parties desirous of making any alteration in the construction of *Poops*, with a view to diminishing the weight (but preserving the requisite strength), may submit their plans for the Committee's consideration and approval.

range of the upper deck in ships with two decks, will be allowed; and, in the siding and moulding of the top-timbers and beams of full poops and top-gallant forecastles, a reduction of *one-fifth* will be allowed.

The united lengths of poop and forecastle are not to exceed three-fifths of the entire length of the upper deck.

RAISED QUARTER-DECKS.

The materials required for the construction of raised quarter-decks to be of the same quality as those named in Table A for the main body of the ship.

In the inside and outside planking, waterways, planksheers, and flat of deck of raised quarter-decks, a reduction of *one-fifth* from the thickness required by the Table B for such parts in the range of the upper deck in ships with two decks, will be allowed.

SPAR DECKS.

In vessels having three decks or tiers of beams, where the space under the upper deck is to be used only for the accommodation of crew and passengers, or to enclose the engine openings of steam vessels, the scantlings are to be regulated as per Section 32.

The total depth of hold in spar-decked ships must not exceed thirteen-sixteenths, nor be less than twelve-sixteenths of the ship's extreme breadth.

In the construction of spar decks, the timbers must be of the same materials as are required by Table A for the top-timbers of the frames of ships according to the several terms of years appointed for such ships to remain on the Character A.

If *all* the said timbers extend to the plank sheer, their siding and moulding may be reduced one-fourth at their heads; but, if only the *alternate* timbers run up to the top height, then a reduction of one-fourth only will be allowed in their moulding at their heads, and in that case there must be a perfect covering board worked all round the ship at the middle deck; and in all cases the middle deck must be a complete deck laid and caulked.

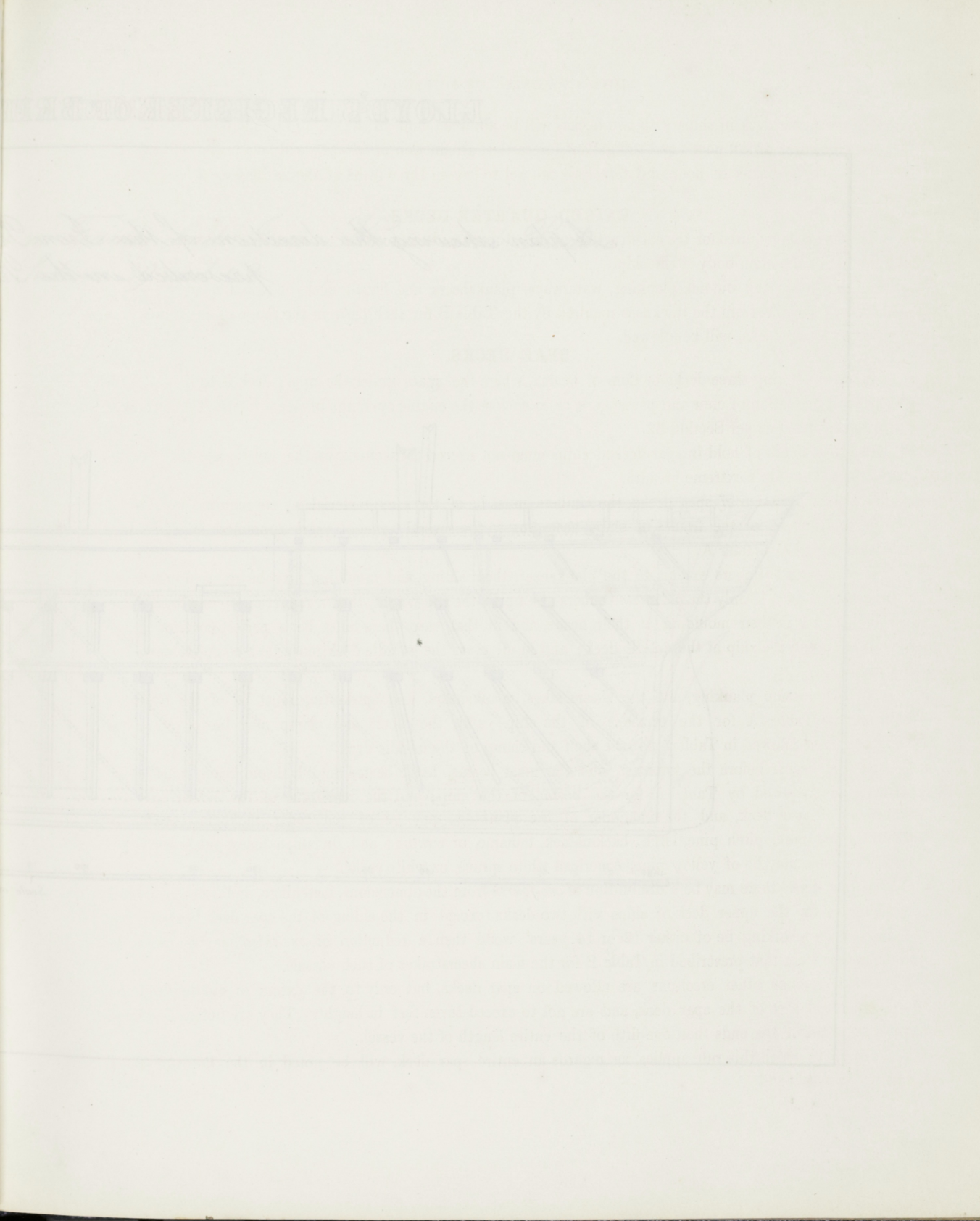
All the outside planking, and the sheerstrakes, planksheers, and spirketting must be of the materials required by Table A for the topsides of the ship; and the shelf and clamp may be of the same quality as those allowed in Table A for the shelf and clamp of the middle deck.

All the beams before the foremast, and the mast beams, hatch beams, and transom beam, must be of the materials required by Table A for the beams of the ship; and the remainder of the beams and the waterways of spar deck, and the remainder of the planking, may be of red cedar, mahogany, Baltic or American red pine, pitch pine, larch, hackmatack, tamarac, or cowdie; and, in ships below the seven years' grade, the same may be of yellow pine, American white spruce, or white cedar.

In spar decks there may be a diminution of *one-fourth* from the dimensions, fastenings, and bolts prescribed in the tables for the upper deck of ships with two decks (except in the siding of the spar deck beams); but if the outside planking be of either 12 or 14 years' wood then a reduction of *one-third* may be made in the thickness from that prescribed in Table B for the main sheerstrakes of such vessels.

Deckhouses or other erections are allowed on spar decks, but only to the extent of one-tenth of the total superficial area of the spar deck, and are not to exceed seven feet in height. They are not to be placed nearer to either of the ends than one-fifth of the entire length of the vessel.

Vessels to which this rule applies, as regards an entire spar deck, will be noted in the Register Book thus—"*Spar decked.*"



A plan shewing the direction of the Iron S
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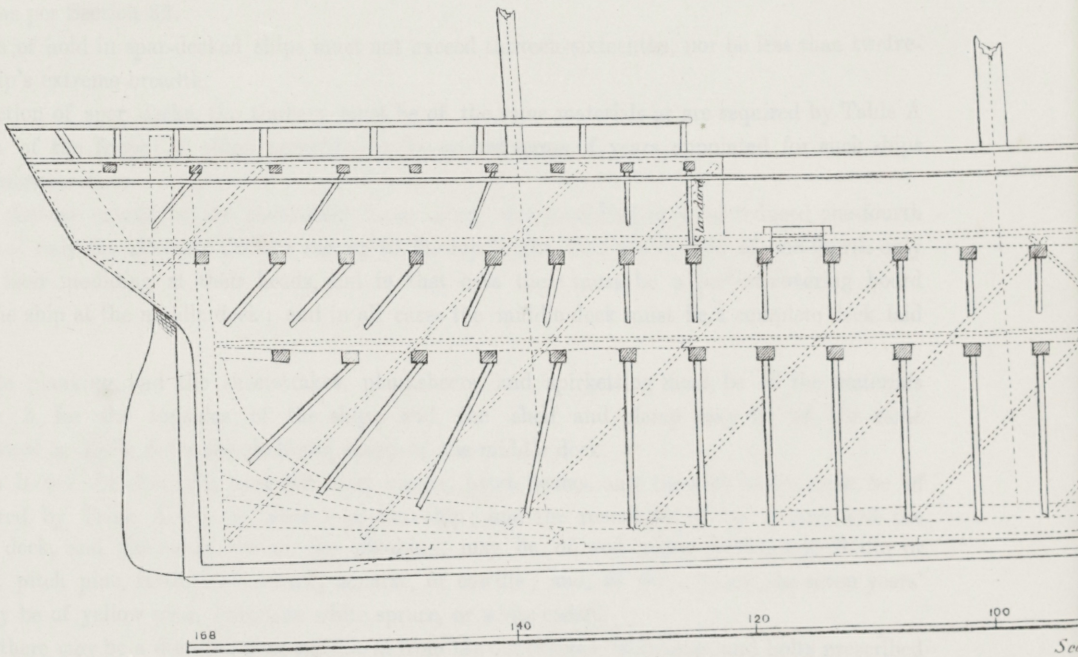
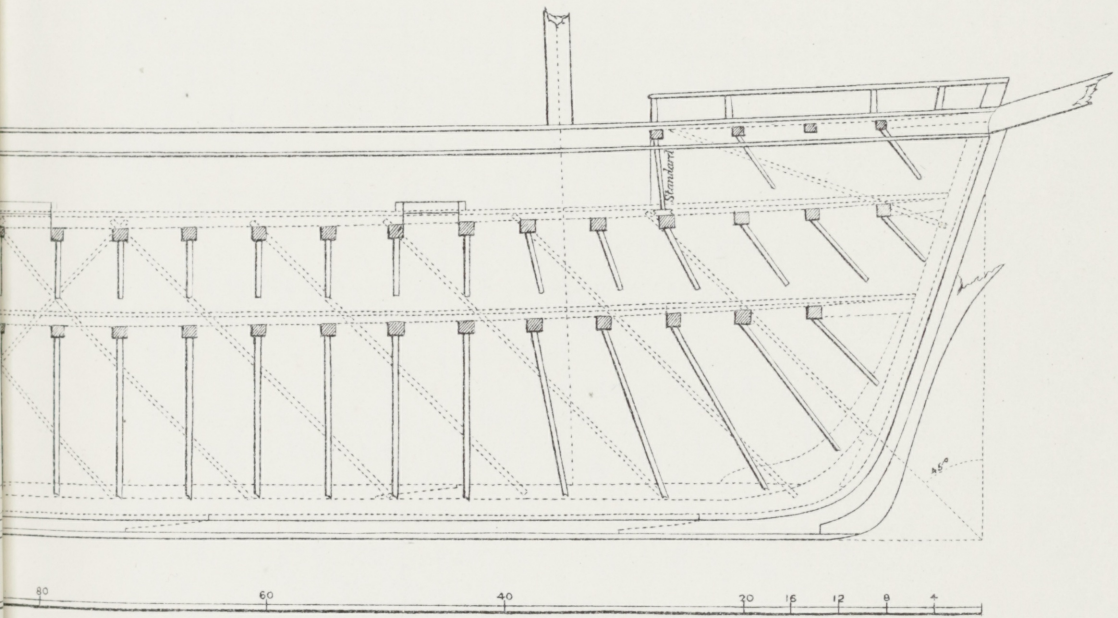
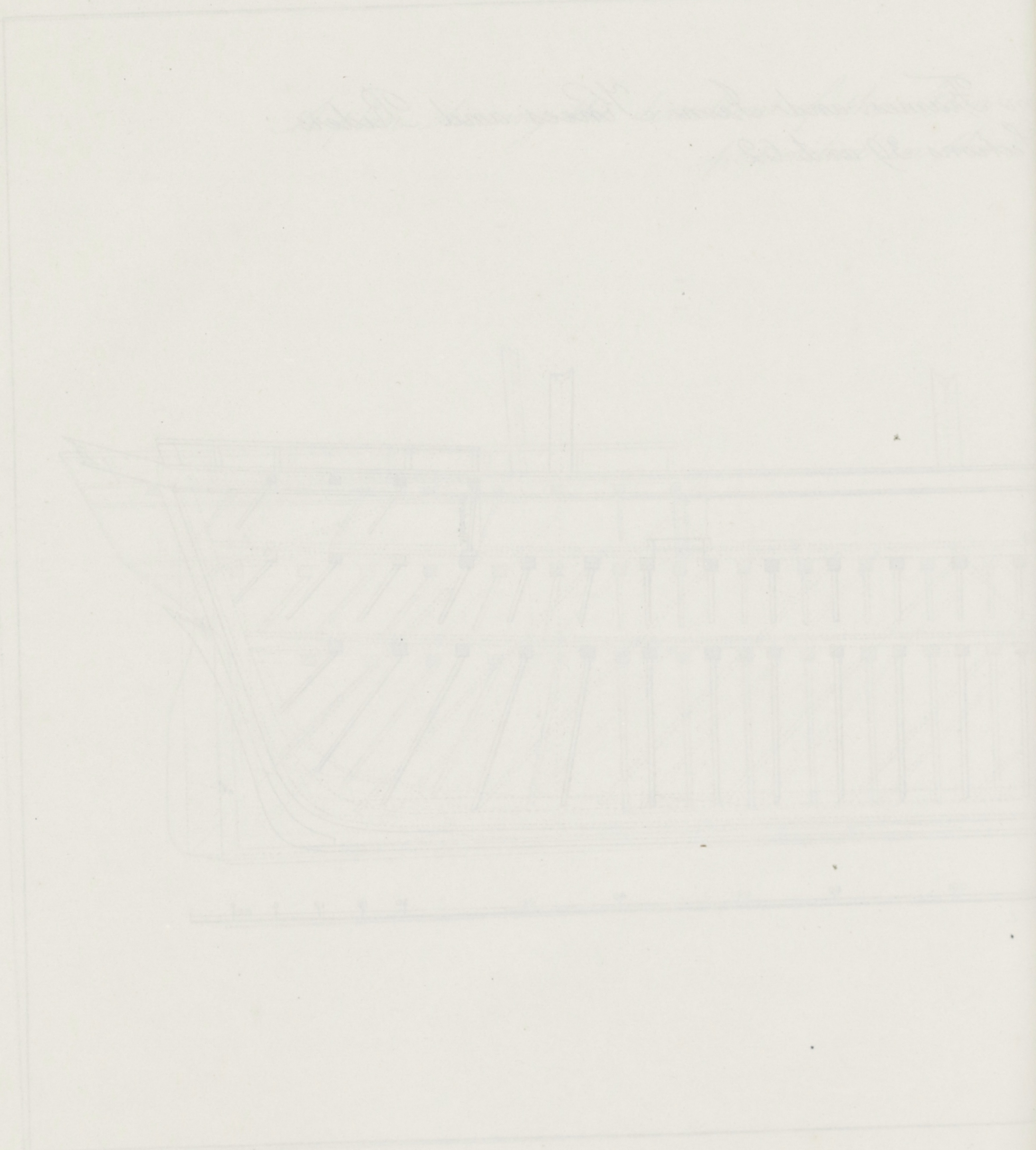
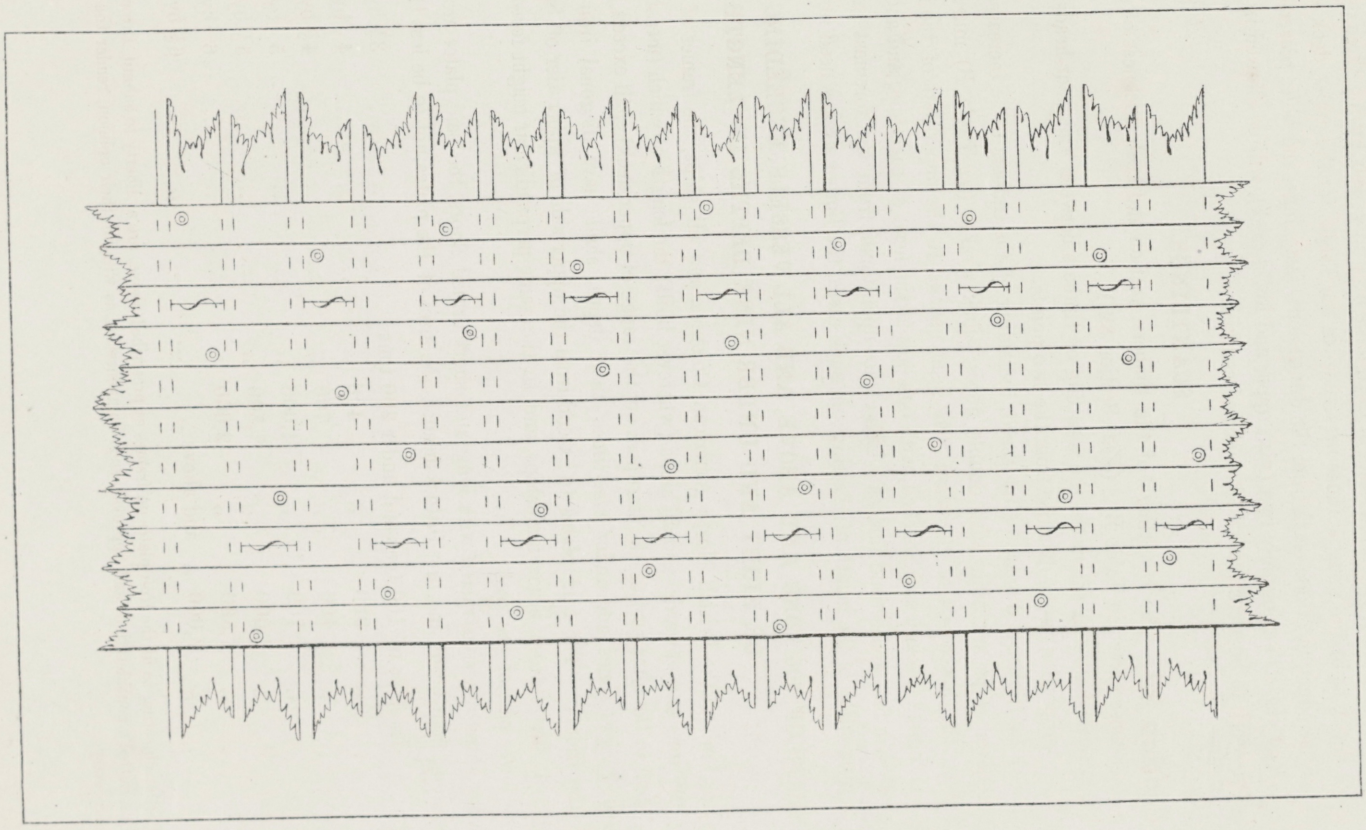


s on Frames. and Iron Knees and Riders.
. Sections 39 and 62.





SKETCH SHOWING THE ARRANGEMENT OF THROUGH BOLTS IN THICK STRAKES OVER DOUBLE FLOORS_SECTION 39.



THREE-DECKED SHIPS.

All dimensions, fastenings, and bolts of the middle deck in vessels having three decks (viz., upper, middle, and lower deck), to be the same as those prescribed in the Tables for the upper deck of ships having only two decks; and a reduction of one-sixth from the dimensions, fastenings, and bolts prescribed in the Tables for the upper deck of vessels having only two (viz., upper and lower deck), will be allowed in the third or upper deck. The middle deck to be a complete deck, laid and caulked.

SCANTLINGS.

Section 39. The Scantlings of the timbers, keelson and keel, thickness of planking, &c., are not to be less than those shown in Table B. (*Vide* Section 32.)

The intermediate dimensions for the scantling of timbers between the floor-heads and the gunwale to be regulated in proportion to the distance from the two points.

Should the timber and space be increased, the siding of the timbers to be increased in proportion.

Whenever ships are built with double floors, thick strakes (*see* Table B) must be worked inside, to extend from the lower part of the short floor-head chocks to the upper part of the long floor-head chocks, and be well bolted through and clenched, with one bolt at the head of each long and short arm of floors, and at the heel of each first and second futtock which comes upon them, from the foremast extending a distance aft equal to three-fifths of the length of the ship; in such cases, the limber strakes need not be through bolted.

FIR SHIPS OF 600 TONS AND ABOVE, AND ALL VESSELS, EXCEEDING FIVE BREADTHS, OR EIGHT AND UNDER NINE DEPTHS IN LENGTH.

Ships built in the British North American Colonies, and all ships, the frames of which are composed of Fir, of 600 tons and upwards, and all ships (wherever built) the length of which (measured from the fore part of the stem to the after part of the sternpost on the range of upper deck) shall exceed *five* times their extreme breadth, or *eight* times and under *nine* times their depth, shall have diagonal iron plates closely inserted *outside* the frame.* The said plates to extend from the upper side of upper tier of beams to the lower part of chocks at first futtock heads amidships, and to the same perpendicular height forward and aft, measured from the lower part of the keel.

When ships are constructed with long and short armed floors, the said plates are to extend to half-way between long floor-heads and first futtock-heads; the sizes of the plates not to be less than as follows, viz.:—

In ships of	100	tons and under	200	tons	...	...	...	$3\frac{1}{2}$ by $\frac{7}{16}$	in.
,,	200	,,	400	,,	...	...	...	4 by $\frac{1}{2}$	,,
,,	400	,,	700	,,	...	...	...	$4\frac{1}{2}$ by $\frac{5}{8}$	,,
,,	700	,,	1,000	,,	...	...	...	5 by $\frac{3}{4}$	,,
,,	1,000	,,	1,500	,,	...	...	...	$5\frac{1}{2}$ by $\frac{13}{16}$	,,
,,	1,500	,,	2,000	,,	...	...	...	6 by $\frac{7}{8}$	,,
,,	2,000	,,	and above...		...	...	...	$6\frac{1}{2}$ by $\frac{7}{8}$	,,

* Parties objecting to fit the iron plates on frames as prescribed above, are at liberty to submit, through the resident Surveyor, for the Committee's consideration and approval, such compensation as will, in their opinion, render the introduction of the iron plates unnecessary.

The plates to be fastened with bolts, one at each alternate timber, not less in diameter than the sizes given for "through butt bolts" in Table D; and to be well protected by proper coating, likewise the timbers to be coated in the scores which are to receive the said plates.

The number of plates to be in proportion of not less than one pair to every twelve feet of the ship's entire length taken as above, but not to be more than eight feet asunder measured on a square; the said plates are to be placed diagonally, at an angle of not less than 45 degrees, their lower ends pointing to the after end of the keel in the after body, and to the fore end of the keel in the fore body, four pairs crossing each other amidships.

All such ships are to have shelves and waterways to each tier of beams, each equal in contents to the transverse sectional area of the beams at their respective ends, as given in Table C. The breadth or faying surface of shelves and waterways to the beams must not be less than the siding given for the beams of the several decks.

The shelves and waterways are to have the beam ends either dowelled or dovetailed to them, and they are to be properly shifted and scarphed; if fastened with copper or yellow metal, to be bolted through the outside planking at every timber with bolts of the sizes given in Table D. The upper deck binding bolts in all cases to be driven through the outside planking.

When the bolts of the hold or lower deck waterway, shelf, spirketting, or clamp, are of *iron*, they may be driven through and clenched on the timbers of the frame, or from the frame and clenched on the waterway, shelf, spirketting or clamp.

A hanging-knee to be also fitted to the lower side of every beam end. In such cases lodging-knees may be dispensed with, except in the mast-rooms.

In addition, vessels of 200 tons and above are to have an *inner waterway* fitted on the beams of the upper deck, to extend amidships for about three-fourths the vessel's length. It may be composed of East India teak, pitch pine, larch, hackmatack, Dantzig, Memel, Riga, or American red pine, for vessels of any class.

The breadth of the inner waterway amidships is to be not less than the siding required for the beams, but it may be reduced in breadth at its extreme ends, and the thickness above the beams is to be not less than once and a half the thickness required by Table B for Flat of Deck. The inner waterway is to be in and out through bolted at alternate timbers; and, if its breadth shall exceed six inches, it is to have two vertical through bolts in each beam end.

The shifts of inside and outside planking are not to be less than 6 feet, unless there be a strake wrought between them, and then a distance of 5 feet will be allowed.

VESSELS EXCEEDING SIX BREADTHS OR NINE AND UNDER TEN DEPTHS IN LENGTH.

In vessels the length of which shall exceed *six* times their extreme breadth, or *nine* times and under *ten* times their depth, the number of plates must be not less than one pair to every *ten* feet of the ship's entire length taken as above, but not to be more than six feet asunder measured on a square, and to be placed diagonally as before described in this Section.*

* In cases where the length of the ship exceeds ten times the depth, the Builders or Owners are to submit, through the resident Surveyor, for the Committee's approval, their plans for giving the vessel the necessary strength longitudinally.

And in addition to the requirements for ships of five times their breadth in length such ships must be fitted with a rider keelson, or a pair of sister keelsons, at the option of the Owner, the transverse sectional area of such rider keelson or sister keelsons each to be equal to two-thirds of that required in Table B for main keelsons.

If a rider keelson be adopted, it is to be fastened with a through bolt (of the size required in Table D for keelson bolts), in every frame; or, if the Owner prefers it, every intermediate bolt may be short, passing only through the main and rider keelsons.*

If sister keelsons be fitted, they must be fastened with through bolts, in number not less than one in every alternate timber, and of the size required in Table D for "scarphs of keels," &c.

BEAMS.

Section 40. The sizes of the deck and hold beams have been regulated so as to be determined by the length of the beams *amidships*, as shown in Table C. The beams will be required to be of the size of the midship beam, except those at the *after end* of the ship, which may be reduced in proportion to their length.

If beams of spruce or yellow pine are used, the siding of such beams shall be one-fourth larger than is prescribed by the above Table, or be increased each way, siding and moulding, equal in area to that amount.

IRON BEAMS.

In cases where Iron Beams are fitted in Wood Ships the beams of the upper deck are to be one-sixteenth of an inch thicker than is required by the Rules for ships built of Iron, in consequence of the greater space between; and the lower deck or hold beams are to be one-eighth of the depth deeper, and one-sixteenth of an inch thicker, than the upper deck beams. The spaces between beams of the several decks not to exceed the spaces at present allowed for wood ships, as per Rule, Section 41. Each tier of beams must have stringer plates riveted on their ends, and tie-plates fore and aft, on each side of the hatchways.

Parties are to submit, through the resident Surveyor, their plans for attaching Iron beams to the ship's sides, for the Committee's approval.

Section 41. The beams of all decks to be in number and size as hereinafter specified, and to be securely fastened to the sides either with lodging-knees of iron or wood, or with a shelf-piece and waterways, as described in Section 39† or with a shelf-piece and knees, or with some other security equal thereto.

* In all cases in which a rider keelson is fitted, it must be fastened as prescribed above, irrespective of the relative dimensions of the ship.

† When the shelves and waterways are fitted and bolted as described in Section 39, having also a hanging-knee to the lower side of every beam end, then lodging-knees may be dispensed with, except in the mast-rooms. In ships of 500 tons and under, where lodging-knees properly bolted are applied, the ordinary plank-clamps may be used, but the bolting of them at alternate timbers, as per Table B, cannot be dispensed with.

WATERWAYS AND SHELVES.

The depth of waterway required for faying surface against timbers, below the underside of the plank-sheer, is to be as shown in Table B, to receive in and out bolts at alternate timbers, with alternate through bolts in shelf, and in clamp where there is no shelf.

Where shelves and waterways are fitted, each should equal in contents the transverse sectional area of the beams at their respective ends, as given in Table C. The breadth or faying surface of shelves and waterways to the beams must not be less than the siding given for the beams of the several decks.

A hanging-knee to be also fitted to the lower side of every beam end. In such cases lodging-knees may be dispensed with, except in the mast-rooms.

The shelves and waterways are to have the beam ends either dowelled or dovetailed to them, and they are to be properly shifted and scarphed; if fastened with copper or yellow metal, to be bolted through the outside planking at every timber with bolts of the sizes given in Table D. The upper deck binding bolts in all cases to be driven through the outside planking.

When the bolts of the hold or lower deck waterway, shelf, spirketting, or clamp, are of *iron*, they may be driven through and clenched on the timbers of the frame, or from the frame and clenched on the waterway shelf, spirketting, or clamp.

All vessels of 200 tons and above to have an inner waterway, as stated in Section 39.

All ships of 150 tons and above to have vertical knees to the DECK beams; and those of 200 tons and above to have vertical knees to the HOLD beams, in number as shown in Table E.

DEPTH OF HOLD FOR SPACING OF BEAMS.

In vessels of 13 feet, and under 15 feet depth of hold, the spacing of the hold beams not to exceed 8 feet apart, and the deck beams 4 feet. Vessels of 15 feet and under 18 feet hold, the spacing not to exceed 8 feet and 4 feet apart alternately, or in that proportion; the deck beams to be placed one over every hold beam, and one in all double spaces. Vessels of 18 feet hold and above, the spacing of the beams not to exceed 4 feet 6 inches; the deck beams to be one over every hold beam.

The depth in all such cases to be determined by taking the measure from the top of the limber-strake (the thickness of which, for measurement, to be taken as prescribed in Table B) to the top of the upper deck beams.

Ships having a depth of hold, measured from the limber-strake to the under side of the lower deck beam, above 13 feet but not exceeding 15 feet, must be secured with iron riders of the sizes, and be fastened, as shown in Table F, and in number not less than one on every fourth floor, on each side, from fore side of foremast to aft side of mizen-mast, to extend from the lower deck beams downwards so as to receive not less than two bolts in a substantial part of the floors; or by orlop beams, sufficient in number and properly secured.

All ships having two decks (viz. upper and lower deck), and exceeding 24 feet in depth from the top of the limber-strake to the top of the upper deck beams, or having three decks (viz. upper, middle, and lower deck), and exceeding 24 feet in depth from the under side of the MIDDLE DECK, to have orlop beams, the number to be in no case less than one-half the number of lower deck beams in the space between the foremast

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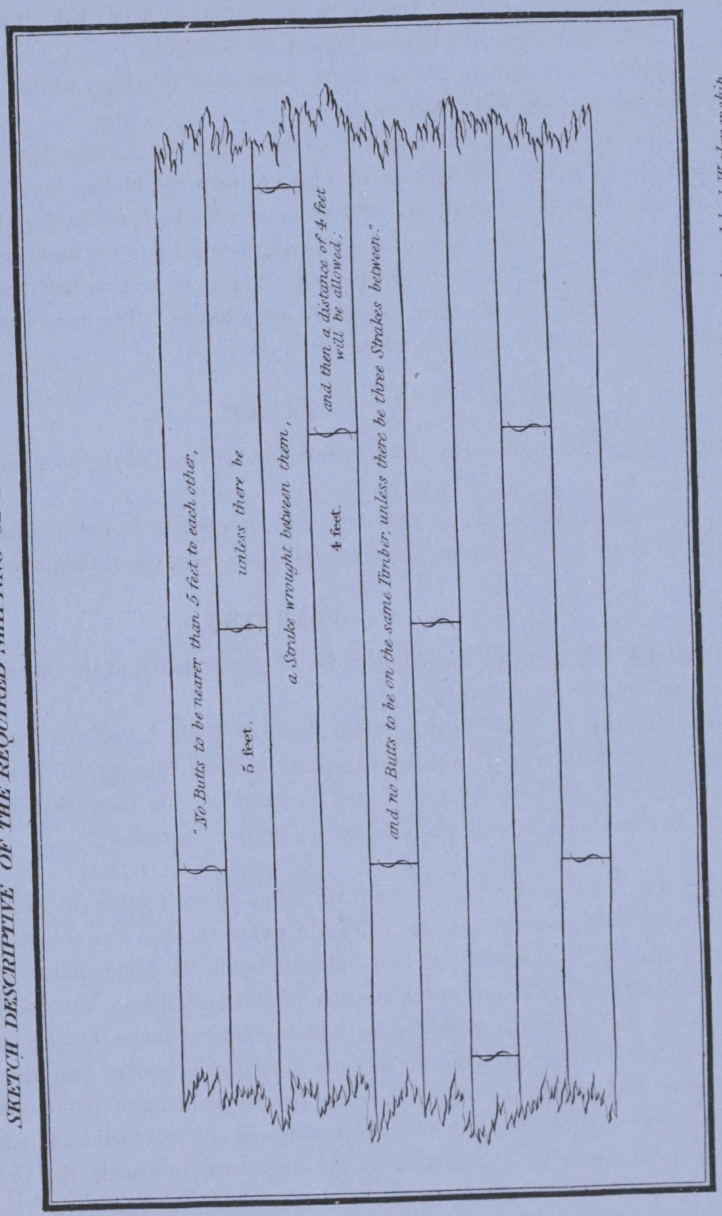
SKETCH DESCRIPTIVE OF THE REQUIRED SHIFTING OF PLANK. *—Section 44. (See also Section 39.)*



The Sketch shews the principle on which the Butts should be arranged, so as to avoid Stepping, *which is deemed bad Workmanship.*

and the mizen-mast, except in the case of flush deck ships, when a depth of 25 feet will be allowed, provided in either case the lower hold does not exceed 15 feet, measured as above from the limber-strakes to the under side of the lower deck beam. Should a house be constructed on such flush deck ship for lodging crew or for store-room, the same not to extend within 10 feet of the sternpost.

The application of this Rule to British North American built ships, and Fir Ships, will not exempt them from the full operation of the Rule, Section 62.

Every ship exceeding 150 tons to have at least one crutch for the security of the heels of the after timber of the frame; one pair of pointers in addition to a knee at each end of the wing transom to connect the stern frame with the after-body of the ship; and a transom over the heels of the stern timbers properly kneed.

The heels of the cant timbers forward and aft to be stepped into the deadwood and bolted through.

All hatchways and mast holes to be properly framed to receive half beams where necessary, and to have mast partners to each tier of beams, except the orlop beams. The mast holes, skylights, and companions to be properly secured to the satisfaction of the Surveyors.

FRAME.

Section 42. All timbers of the frame, including those of the poop and forecastle, to extend to the extreme height.

The shifts of timber in vessels of 200 tons and upwards to be not less than one-seventh of their main breadth; and, in ships under 200 tons, to be not less than one-sixth of their main breadth.

PLANKING.

Section 43. The outside planking to be of good quality, of the description prescribed in Table A, to be clear of sap and free from all defects.

The inside planking to be of the description shown in Table A, and free from all foxy, or druxy defects, and decayed knots. With regard to the ceiling plank, and the efficiency of its fastening, it will be required that the planking shall be properly shifted and fastened so that there shall be at least either treenails or through bolts, or short bolts, in each plank of the ceiling *in every timber*.

Section 44. No butts to be nearer than 5 feet to each other (*see* Section 39, for vessels exceeding five breadths or eight and under nine depths in length), unless there be a strake wrought between them, and then a distance of 4 feet will be allowed; and no butts to be on the same timber, unless there be three strakes between, as more particularly shown in the diagram annexed (*see Plate*), but vessels under 200 tons will be exempted from the full operation of this rule; and in ships of larger tonnage a literal compliance with it will be dispensed with in cases wherein it may be satisfactorily proved that the departure from the rule is only partial, being confined to the ends of the ship, or the planking of the topside, and does not injuriously affect the ship's general strength; but such relaxation will not be sanctioned unless an accurate description of the shifting of the plank be transmitted by the Surveyors, to enable the Committee to form a proper judgment on the case.

The thickness of the plank, according to the tonnage of the ship, is not in any instance to be less than is prescribed in Table B.

BREADTH OF WALES.

Section 45. The breadth of the wales in every case is to be regulated as under, viz.:—

When the extreme length of the ship, measured from the fore part of the stem to the after part of the sternpost on the range of upper deck, is six times her depth of hold (or less), the wales are to be in breadth 3 in. to every foot of the depth of hold.

When the extreme length of the ship is eight times her depth of hold, the wales are to be in breadth $3\frac{1}{2}$ in. to every foot of the depth of hold.

When the extreme length of the ship is ten times her depth of hold (or more), the wales are to be in breadth 4 in. to every foot of the depth of hold.

And other intermediate dimensions in these proportions.

BILGE PLANKS.

The breadth of the bilge planks to be two-thirds that of the wales.

FASTENINGS.

Section 46. Treenails to be of good quality, and of a description equal to the best material through which they pass;* if, however, in Ships built in the British North American Colonies, or of Fir, treenails be used of materials not inferior to those comprised in line No. 2 in Table A, including Locust and all Australian and tropical hard woods of durable quality, and Beech in the bottom not higher than floor-heads, a notation of "*Hard Wood Treenails*" will be inserted against the Ship's name in the Register Book.

The Treenails are to be straight and circular, being either engine-turned, compressed, or planed, not grain-cut or knotty, and must be free from sap and tightly driven, and in all cases the treenails are to be efficiently caulked or wedged outside. In all cases in which planks above eleven inches in width shall be used, they must be double fastened; and those above eight inches in width must be treenailed double and single, except bolts intervene; and, if less than that width, then to be treenailed single.

Not less than two-thirds of the treenails are to be driven through the inside planking, clamps, &c.

Every butt in each outside plank to be fastened with *two* bolts, one of which may be in the adjoining timber, and one to be through and clenched.†

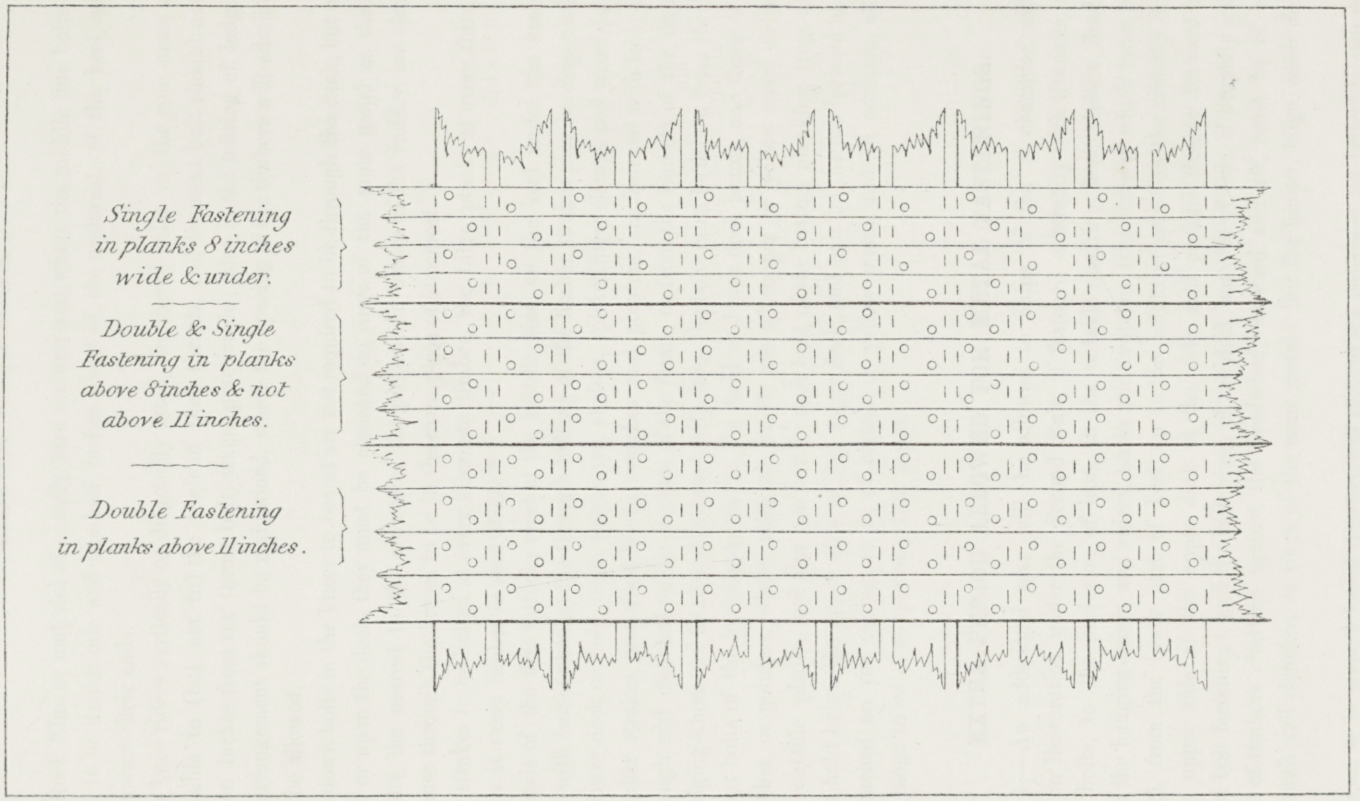
The bilges to be secured with bolts so placed that from the foremast, extending a distance aft equal to three-fifths of the length of the keel, there shall, in ships under 300 tons, be at least one bolt through and clenched in each first futtock; and that in ships of 300 tons and upwards there shall be at least TWO bolts through and clenched for each set of timbers in one or other of the thick bilge strakes; or the bilge planks may be secured as defined in *Paragraph* 1 for EXTRA PERIOD ALLOWED FOR METAL FASTENINGS.

All the bolts of the knees, breasthooks, crutches, riders, transoms, pointers, and keelsons, shelf-pieces, waterways, heels of timbers against fore and after deadwood, and of all other material fastenings, are to be driven through and clenched on rings of the same metal as the bolts. In vessels of 150 tons and under, where the keel

* Parties desiring a modification of this requirement must make special application to the Committee in each case.

† Where thick garboard strakes are used, they must be bolted horizontally through the keel and each other.

SKETCH SHOWING THE PROPER ARRANGEMENT OF TREENAILS OR BOLTS_SECTION 46.



BREADTH OF WALES.

Section 45. The breadth of the wales in every case is to be regulated as under, viz. :—

When the extreme length of the ship, measured from the fore part of the stem to the after part of the sternpost on the range of upper deck, is six times her depth of hold (or less), the wales are to be in breadth 3 in. to every foot of the depth of hold.

When the extreme length of the ship is eight times her depth of hold, the wales are to be in breadth $3\frac{1}{2}$ in. to every foot of the depth of hold.

When the extreme length of the ship is ten times her depth of hold (or more), the wales are to be in breadth 4 in. to every foot of the depth of hold.

And other intermediate dimensions in these proportions.

BILGE PLANKS.

The breadth of the bilge planks to be two-thirds that of the wales.

FASTENINGS.

Section 46. Treenails to be of good quality, and of a description equal to the best material through which they pass;* if, however, in Ships built in the British North American Colonies, or of Fir, treenails be used of materials not inferior to those comprised in line No. 2 in Table A, including Locust and all Australian and tropical hard woods of durable quality, and Beech in the bottom not higher than floor-heads, a notation of "*Hard Wood Treenails*" will be inserted against the Ship's name in the Register Book.

The Treenails are to be straight and circular, being either engine-turned, compressed, or planed, not grain-cut or knotty, and must be free from sap and tightly driven, and in all cases the treenails are to be efficiently caulked or wedged outside. In all cases in which planks above eleven inches in width shall be used, they must be double fastened; and those above eight inches in width must be treenailed double and single, except bolts intervene; and, if less than that width, then to be treenailed single.

Not less than two-thirds of the treenails are to be driven through the inside planking, clamps, &c.

Every butt in each outside plank to be fastened with *two* bolts, one of which may be in the adjoining timber, and one to be through and clenched.†

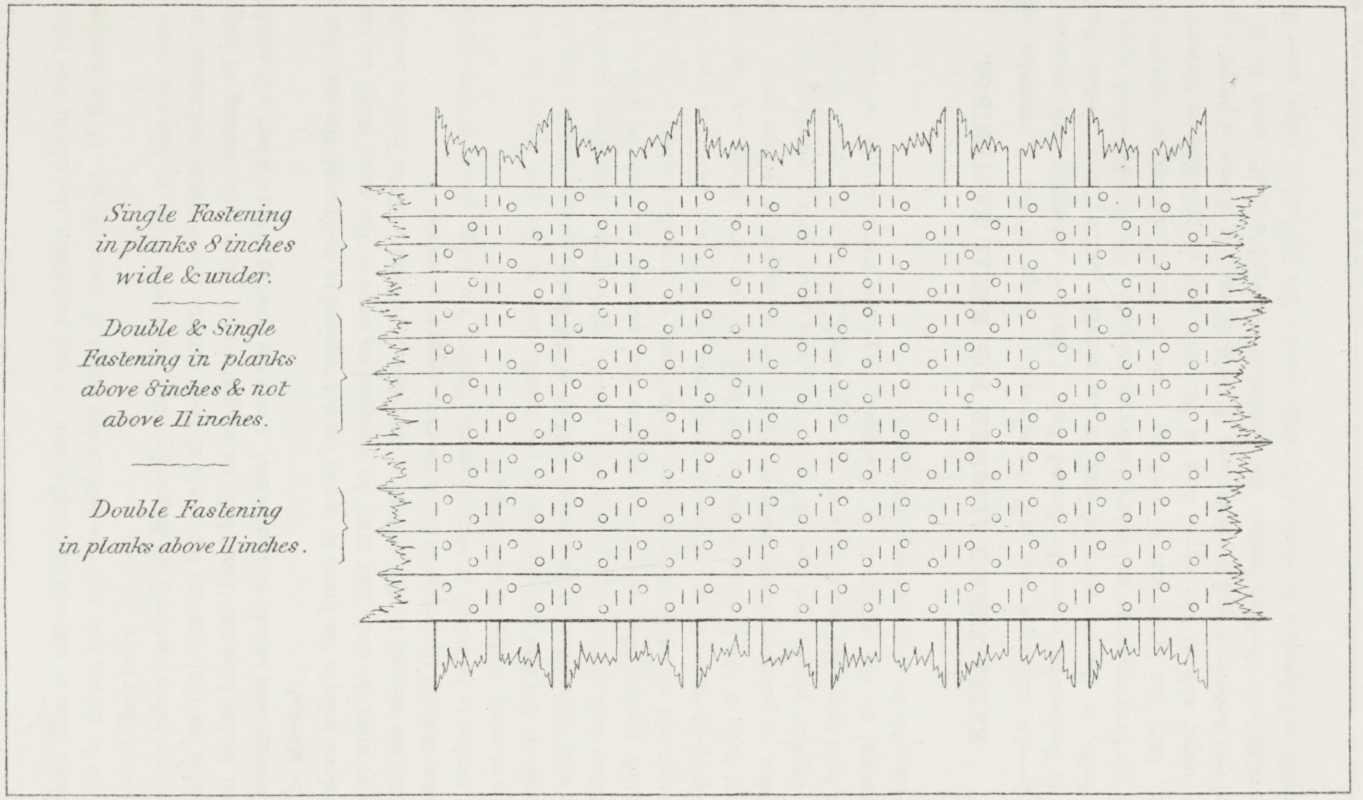
The bilges to be secured with bolts so placed that from the foremast, extending a distance aft equal to three-fifths of the length of the keel, there shall, in ships under 300 tons, be at least one bolt through and clenched in each first futtock; and that in ships of 300 tons and upwards there shall be at least TWO bolts through and clenched for each set of timbers in one or other of the thick bilge strakes; or the bilge planks may be secured as defined in *Paragraph* 1 for EXTRA PERIOD ALLOWED FOR METAL FASTENINGS.

All the bolts of the knees, breasthooks, crutches, riders, transoms, pointers, and keelsons, shelf-pieces, waterways, heels of timbers against fore and after deadwood, and of all other material fastenings, are to be driven through and clenched on rings of the same metal as the bolts. In vessels of 150 tons and under, where the keel

* Parties desiring a modification of this requirement must make special application to the Committee in each case.

† Where thick garboard strakes are used, they must be bolted horizontally through the keel and each other.

SKETCH SHOWING THE PROPER ARRANGEMENT OF TREENAILS OR BOLTS_SECTION 46.



is of American Rock Elm, or material of equally hard texture, and where the middle line bolts are of iron, they may be allowed to be driven one and one-half inches short of the underside of the keel, with a wood plug tightly driven against their ends.

In knees or knee riders vertically or diagonally fitted, the throat bolts in the side arms are to be placed as near as possible to (but not in) the angle of their throats, and the next bolt should not be at a greater distance than ten inches from the throat bolt, where practicable; also in the bolting of lodging or horizontal knees the same arrangement should be maintained, where the spacing of the timbers will admit of it. "*Jumped knees*" will not be allowed.

The up and down bolts in the knees to beams are not required to be through the deck, but whether clenched upon the beams, or upon the deck, they must be clenched on rings of the same metal as the bolts.

The two bolts, the nearest to the crowns of the pintles and braces of the rudder, are also to be through and clenched, those through the braces to be in the main piece of sternpost.

The limber strakes to be bolted at every alternate timber, the bilge planks at every third timber, and the shelves or clamps at every timber *in each strake.**

When the heels of the first futtocks meet at the middle line on the keel under the keelson (either with full moulding or with *butted* chocks) the through bolting of the limber strakes may be dispensed with.

When the lower deck or hold beam waterways, shelves, spirkettings, clamps and wood lodging-knees, the bilge planks, limber strakes, and wood hooks, crutches and pointers, are fastened with iron, the bolts may be either driven through and clenched on the timbers of the frame, or from the timbers of the frame and clenched inside (if iron lodging-knees are fitted and fastened with iron, the bolts must be driven from the inside), provided that the in and out bolts of the hanging-knees to the hold or lower deck beams, and those of the knee riders, iron hooks, crutches, or pointers, where such are fitted, are of copper or yellow metal driven through and clenched on the outside plank; and also one bolt in each butt of the bottom planking from the keel to one-fifth the depth of hold below the upper side of the upper deck, and parallel thereto forward and aft, be driven through and clenched on the ceiling, to be of copper or yellow metal, and, in addition, all the short bolts within the same range to be of copper or yellow metal.

EXTRA PERIOD ALLOWED FOR METAL FASTENINGS.

Paragraph 1.—An additional year will be allowed to Ships of the A character, either on original Classification or on Restoration under the Second Rule, if fastened externally with treenails, and with copper or yellow metal bolts, to the exclusion of iron, in the outside planking, keel, keelson, deadwood, stem and sternpost, also in the hanging-knees and riders, hooks and crutches (the bolts of which must pass through the outside planking), from the lower part of keel up to the height of one-fifth the midship depth of hold, set down below the upper side of the upper deck at the side, and parallel thereto forward and aft; above which all external bolt fastenings, and the fastenings of the deck, may be of iron, if properly galvanized. The bolts in the heels of timbers abutting against the deadwood, forward and aft, must be of copper or yellow metal driven through and clenched on rings of the same metal; but the limber, bilge, *lower deck or hold beam*,

* Watercourses are to be properly formed at underside of all floors and futtocks at the limbers on each side of middle line, so as to allow water to reach the pumps freely.

shelf or clamp, and lodging-knee bolts, may be of plain iron, driven through, and clenched on the timbers of the frame, or from the timbers of the frame, and clenched inside. The whole of the remaining fastenings inside may be of plain iron. If iron lodging-knees are fitted, their fastenings must be driven from the inside. The limber strakes to be bolted at every alternate timber, the bilge planks at every third timber, and the shelves or clamps at every timber in each strake.

In all cases through bolts must be clenched on rings of the same metal.

Vessels thus fastened will have the notation of c.f. (Copper Fastened) recorded in the Register Book.

Paragraph 2.—Two additional years will be allowed to ships of the A character, either on original Classification or on Restoration under the Second Rule, if fastened externally with treenails, and with copper or yellow metal bolts or dumps, to the exclusion of iron, from the lower part of keel to the waterway inclusive, and the whole of the inside bolt fastenings, including fastenings of deck, frame bolts, and bolts in iron straps on timbers, and also the chain and preventer bolts be of properly galvanized iron; but the bolts in heels of timbers abutting against deadwood, forward and aft, must be of copper or yellow metal driven through and clenched on rings of the same metal. The limber, bilge, *lower deck or hold beam*, shelf or clamp, and lodging-knee bolts, may be of properly galvanized iron if driven through and clenched on the timbers of the frame, or from the timbers of the frame and clenched inside. If iron lodging-knees are fitted, their fastenings must be driven from the inside, but the whole of the bolts in the hanging-knees, riders, hooks and crutches, must pass through the outside planking and be of copper or yellow metal. The limber strakes to be bolted at every alternate timber, the bilge planks at every third timber, and the shelves or clamps at every timber in each strake.

Vessels thus fastened will have the notation of C.F. (Copper Fastened) recorded in the Register Book.

Paragraph 3.—Three additional years will be added on original Classification if, in lieu of treenails above the floor-heads, the whole of the planking is fastened with bolts of copper or yellow metal to the waterway inclusive, and the whole of the inside bolt fastenings, including fastenings of deck, frame bolts, and bolts in iron straps on timbers, and also the chain and preventer bolts be of properly galvanized iron; but the bolts in heels of timbers abutting against deadwood, forward and aft, must be of copper or yellow metal *driven through and clenched on rings of the same metal.* The whole of the bolts in the hanging and lodging-knees, riders, hooks and crutches, must be through and clenched on the outside planking. In such cases of substitution the bolts must be in number the same as is already prescribed above for treenails; the proportion of through bolts must be at least two-thirds, and all the through bolts must be of malleable metal, and clenched on rings of the same metal inside.

The sizes of the copper or mixed metal bolts must be as under, viz.:—

In ships of	150 tons	and under	200 tons	...	...	...	$\frac{5}{8}$ in.	Smaller sizes must not be used.
200	ditto	350	,,	...	...	...	$\frac{3}{4}$ in.	
350	ditto	500	,,	...	...	...	$\frac{13}{16}$ in.	
500	ditto	700	,,	...	...	...	$\frac{7}{8}$ in.	
700	ditto	900	,,	...	...	...	$\frac{15}{16}$ in.	
900	and above			...	...	...	1 in.	

and the lengths of the short bolts not less than as follows, viz.:—

When used in plank of $2\frac{1}{2}$ inches, to be 7 inches long
3 „ 8 „
4 „ 10 „
5 „ 12 „

and so on in proportion for plank of other thicknesses. The sizes of the bolts required in the several parts must not be less than is shown in Table D.

Vessels thus fastened will have the notation of C.T. (Copper Treenails) recorded in the Register Book.

In British North American or Colonial built Ships, and all Ships wherever built, the frames of which are composed of Fir, in order to entitle them to the additional term proposed by these sections, Nos. 1, 2, and 3, the rule with reference to "Salting" (Section 37) must in all cases have been complied with originally, or during repair under the Second Rule for Restoration.

Section 47. In every case where the butt bolts are not through and clenched, One Year will be deducted from the period which would otherwise be assigned in the Classification of the vessel.

SHIPS BUILT UNDER A ROOF.

Section 48. Ships built under a substantial and efficient roof, kept in good repair, which shall project at each end beyond the length, and on each side beyond the breadth, a quantity equal to half the breadth of the vessel, shall have One Year added to the period prescribed, provided they shall have been surveyed whilst building, and shall have occupied a period of not less than twelve months in their construction, and in which no plank, except as follows, shall have been worked until the expiration of at least three months after the frame was completed, viz.:—not more than three strakes of bilge planks, and two strakes of outside plank in the way of each tier of beams, also the clamps inside, so that the beams may be put in their places.*

Section 49. The scantlings and dimensions for all sized vessels to be proportionately regulated, agreeably to Table B.

SHIPS CLASSED 11 A.

Section 50. Ships surveyed while building, in which *all the materials required for a Twelve Years' Ship shall have been used*, and most of the other requisites for that grade fulfilled, but which, from partial deficiencies, may not appear to be in all respects entitled to the full period, although superior to the description of a Ten Years' ship, may be marked in the book thus, 11 A; thereby denoting that they are to remain on that grade *Eleven Years*, provided they be kept in a state of efficient repair.

SHIPS CLASSED 10 A.

Section 51. Ships surveyed while building, in which every *alternate* set of timbers are frame-bolted together throughout their entire lengths, and the scantling and shifts of the timbers, the thickness and shifts of the planks, and size of fastenings may be the same as are required by the Rules, and the description

* In ships not exceeding 400 tons, a relaxation of the period herein required may be allowed (but not exceeding four months) provided application be made to the Committee, who will appoint a special survey, and who will require a report of the date when the timber was felled, its condition after being sided and moulded and stacked for seasoning, and also when in frame.

The hold to be cleared, and proper stages to be made both inside and outside.

All air-courses and the limbers to be cleared.

The condition of the timbers of the frame to be further ascertained, by a *new* listing not less than four inches wide being *cut* out of the ceiling at each end of the hold, on each side, between the keelson and air-course under hold beam clamp, for one-fifth the entire length of the ship.

One treenail to be driven out from every alternate frame or fourth timber, between the upper edge of the wales and planksheers, and one from every alternate frame or fourth timber, between the upper edge of the wales and the light water-mark, and at such other parts of the bottom as the Surveyors may direct, so as to enable a judgment to be formed as to the general state of the treenails, and the timbers and planking in the treenail holes.

Bolts, if of iron, in number not less in any case than six on each side, in the range of each tier of beams to be driven out in ships of 500 tons and under, and increased in number in proportion to the size of the ship.

If the fastenings in the range of the lower deck be *of iron not through the outside planking*, one plank on either side is to be removed, so that the condition of the fastenings may be ascertained; if they are not in a satisfactory condition, the vessel must be through-bolted in these parts, as the Surveyors may direct.

All treenails, bolts, and listings, removed for the examination of the vessel's condition, to be from such parts as the Surveyors may direct.

Where the middle line bolts are of iron, their condition is to be ascertained; but, if this be not practicable, additional bolts of sufficient size must be driven through the keelson, floors, and keel, in each alternate frame, also through the stem, apron, sternpost, and deadwood.

All yellow metal bolts to be tested where practicable, to ascertain if any are broken.

The condition of the oakum and caulking to be ascertained.

In the case of vessels allowed an additional year in classing for salting under Section 37, the state of the salting throughout such vessels is to be ascertained and reported upon, and, if necessary, the salt is to be renewed.

The windlass to be unhung, and its wood lining sufficiently stripped for examination.

The cables, masts, spars, and general equipment to be attended to, as prescribed in Sections 72 to 76.

The attention of the Surveyors shall then be particularly directed to the state of the upper or main deck and comings, the upper and lower deck bolts, whether of iron or copper, and the outside planks through which they pass, the planksheers, waterways, and beams, so far as they can be examined; the stem, apron, hawse-timbers, knight-heads, breasthooks, sternpost, inner-post, and transoms; the floors, keelsons, and keel; the rudder and windlass; the planking outside and inside, and the treenails; the frame and inner surface of the outside planking, where they can be seen; and the sheer and general form of the ship.

The ship to be efficiently repaired with suitable materials.

The Surveyors on these points shall transmit to the Committee a detailed report, accompanied by such observations as may occur to them, from inspection of the ship, or from information of the repairs she may have received. If, from the report of such Special Survey, the ship shall appear to be in a sound and efficient state, the Committee shall continue such Ship on the letter A, for such further period as they may think fit, not exceeding, however, *one-third* of the number of years which had been assigned originally, or on Restoration.

No Ship, however, can have a continuation of the A Character *after Restoration* unless the last paragraph, Section 56, or the 2nd and 3rd paragraphs of Section 57, be complied with.

Ships classed A for a less period than six years, will be allowed a Continuation of two years, provided that, in addition to the above requirements, the Owner shall have removed a plank in each buttock.

Ships built in the British North American Colonies will have to comply with the Rules, Section 63.

If, however, at the time of the above Survey, or at any time during the term of Continuation, the ship be *diagonally* doubled according to Section 68; then, in the case of ships built of wood materials of the 5 years' grade and under, they will be allowed 2 years additional on account of such diagonal doubling; those built of materials exceeding 5 and under 12 years' grade will be allowed 3 years additional, and those built of 12 years' materials and upwards, 4 years additional; provided a strake all fore and aft at the upper edge of the doubling, or the planksheer be removed.

SURVEY No. 2.

For the purpose of holding such Survey, the ship must be placed in dry dock, or laid on blocks upon ways, so that the keel may be examined.

All sheathing (wood or metal) to be entirely stripped off the bottom, and elsewhere.*

All the outside planking from the light water-mark upwards, including the planksheers and waterways, to be scraped or dubbed bright.

The hold to be cleared, and proper stages made both inside and outside.

All air-courses and the limbers to be cleared.

The condition of the timbers of the frame to be further ascertained by the removal of all the treenails in *one* strake in the topsides fore and aft on each side, and by the removal of *two* planks on each side above the wales (except in vessels of 200 tons or under, when the removal of *one* plank on each side will be deemed sufficient).

In addition, a plank to be removed in each bow and each buttock.

One treenail to be driven out from every alternate frame or fourth timber between the upper edge of the wales and the light water-mark, and at such other parts of the topsides and bottom as the Surveyors may direct, so as to enable a judgment to be formed as to the general state of the treenails, and the timbers and planking in the treenail holes.

If the *whole* of the treenails from the light water-mark upwards have to be renewed, the removal of a plank in each bow and buttock will be sufficient, provided the timbers in the treenail hole be examined, and found in good condition.

Bolts, if of iron, in number not less in any case than six on each side, in the range of each tier of beams to be driven out in ships of 500 tons and under, and increased in number in proportion to the size of the ship.

* If the ship has been sheathed with wood over felt, within a period of five years, and the plank shall, when so sheathed, have been brightened, and the condition of the bolts, planking, treenails, and caulking ascertained and favourably reported upon by the Surveyors, the stripping of the wood sheathing may, on application to the Committee, be dispensed with, provided that the sheathing which covers the binding-bolts and raft-ports, and a strake of sheathing all fore and aft on each side under the wales be removed, and listing of sheathing be cut out at hood ends; and the planking, fastenings, and caulking so exposed, shall prove to be in good condition; but, whenever it is removed, the outside planking is to be scraped or dubbed bright, and examined as prescribed by the above Rule.

The hold to be cleared, and proper stages to be made both inside and outside.

All air-courses and the limbers to be cleared.

The condition of the timbers of the frame to be further ascertained, by a *new* listing not less than four inches wide being *cut* out of the ceiling at each end of the hold, on each side, between the keelson and air-course under hold beam clamp, for one-fifth the entire length of the ship.

One treenail to be driven out from every alternate frame or fourth timber, between the upper edge of the wales and planksheers, and one from every alternate frame or fourth timber, between the upper edge of the wales and the light water-mark, and at such other parts of the bottom as the Surveyors may direct, so as to enable a judgment to be formed as to the general state of the treenails, and the timbers and planking in the treenail holes.

Bolts, if of iron, in number not less in any case than six on each side, in the range of each tier of beams to be driven out in ships of 500 tons and under, and increased in number in proportion to the size of the ship.

If the fastenings in the range of the lower deck be *of iron not through the outside planking*, one plank on either side is to be removed, so that the condition of the fastenings may be ascertained; if they are not in a satisfactory condition, the vessel must be through-bolted in these parts, as the Surveyors may direct.

All treenails, bolts, and listings, removed for the examination of the vessel's condition, to be from such parts as the Surveyors may direct.

Where the middle line bolts are of iron, their condition is to be ascertained; but, if this be not practicable, additional bolts of sufficient size must be driven through the keelson, floors, and keel, in each alternate frame, also through the stem, apron, sternpost, and deadwood.

All yellow metal bolts to be tested where practicable, to ascertain if any are broken.

The condition of the oakum and caulking to be ascertained.

In the case of vessels allowed an additional year in classing for salting under Section 37, the state of the salting throughout such vessels is to be ascertained and reported upon, and, if necessary, the salt is to be renewed.

The windlass to be unhung, and its wood lining sufficiently stripped for examination.

The cables, masts, spars, and general equipment to be attended to, as prescribed in Sections 72 to 76.

The attention of the Surveyors shall then be particularly directed to the state of the upper or main deck and comings, the upper and lower deck bolts, whether of iron or copper, and the outside planks through which they pass, the planksheers, waterways, and beams, so far as they can be examined; the stem, apron, hawse-timbers, knight-heads, breasthooks, sternpost, inner-post, and transoms; the floors, keelsons, and keel; the rudder and windlass; the planking outside and inside, and the treenails; the frame and inner surface of the outside planking, where they can be seen; and the sheer and general form of the ship.

The ship to be efficiently repaired with suitable materials.

The Surveyors on these points shall transmit to the Committee a detailed report, accompanied by such observations as may occur to them, from inspection of the ship, or from information of the repairs she may have received. If, from the report of such Special Survey, the ship shall appear to be in a sound and efficient state, the Committee shall continue such Ship on the letter A, for such further period as they may think fit, not exceeding, however, *one-third* of the number of years which had been assigned originally, or on Restoration.

No Ship, however, can have a continuation of the A Character *after Restoration* unless the last paragraph, Section 56, or the 2nd and 3rd paragraphs of Section 57, be complied with.

Ships classed A for a less period than six years, will be allowed a Continuation of two years, provided that, in addition to the above requirements, the Owner shall have removed a plank in each buttock.

Ships built in the British North American Colonies will have to comply with the Rules, Section 63.

If, however, at the time of the above Survey, or at any time during the term of Continuation, the ship be *diagonally* doubled according to Section 68; then, in the case of ships built of wood materials of the 5 years' grade and under, they will be allowed 2 years additional on account of such diagonal doubling; those built of materials exceeding 5 and under 12 years' grade will be allowed 3 years additional, and those built of 12 years' materials and upwards, 4 years additional; provided a strake all fore and aft at the upper edge of the doubling, or the plankshеer be removed.

SURVEY No. 2.

For the purpose of holding such Survey, the ship must be placed in dry dock, or laid on blocks upon ways, so that the keel may be examined.

All sheathing (wood or metal) to be entirely stripped off the bottom, and elsewhere.*

All the outside planking from the light water-mark upwards, including the planksheers and waterways, to be scraped or dubbed bright.

The hold to be cleared, and proper stages made both inside and outside.

All air-courses and the limbers to be cleared.

The condition of the timbers of the frame to be further ascertained by the removal of all the treenails in *one* strake in the topsides fore and aft on each side, and by the removal of *two* planks on each side above the wales (except in vessels of 200 tons or under, when the removal of *one* plank on each side will be deemed sufficient).

In addition, a plank to be removed in each bow and each buttock.

One treenail to be driven out from every alternate frame or fourth timber between the upper edge of the wales and the light water-mark, and at such other parts of the topsides and bottom as the Surveyors may direct, so as to enable a judgment to be formed as to the general state of the treenails, and the timbers and planking in the treenail holes.

If the *whole* of the treenails from the light water-mark upwards have to be renewed, the removal of a plank in each bow and buttock will be sufficient, provided the timbers in the treenail hole be examined, and found in good condition.

Bolts, if of iron, in number not less in any case than six on each side, in the range of each tier of beams to be driven out in ships of 500 tons and under, and increased in number in proportion to the size of the ship.

* If the ship has been sheathed with wood over felt, within a period of five years, and the plank shall, when so sheathed, have been brightened, and the condition of the bolts, planking, treenails, and caulking ascertained and favourably reported upon by the Surveyors, the stripping of the wood sheathing may, on application to the Committee, be dispensed with, provided that the sheathing which covers the binding-bolts and raft-ports, and a strake of sheathing all fore and aft on each side under the wales be removed, and listing of sheathing be cut out at hood ends; and the planking, fastenings, and caulking so exposed, shall prove to be in good condition; but, whenever it is removed, the outside planking is to be scraped or dubbed bright, and examined as prescribed by the above Rule.

If the fastenings in the range of the lower deck be *of iron, not through the outside planking*, one plank on either side is to be removed, so that the condition of the fastenings may be ascertained; if they are not in a satisfactory condition, the vessel must be through-bolted in these parts, as the Surveyors may direct.

Where the middle line bolts are of iron, their condition is to be ascertained; but, if this be not practicable, additional bolts of sufficient size must be driven through the keelson, floors, and keel in each alternate frame, also through the stem, apron, sternpost, and deadwood.

Plank, or *new* listing of ceiling of sufficient breadth (not less than 4 inches wide), at the discretion of the Surveyors, to be cut out of the ceiling in the range of the floor-heads, or at such height as may, in the judgment of the Surveyors, best expose the timbers of the frame to view, at each end of the hold on each side for one-fifth the entire length of the ship, and for the remaining three-fifths of the ship's length, the state of the timbers to be ascertained by driving out a treenail from every fourth timber in one or other of the strakes of bilge planking. If the Shipowner should prefer it, planking may be removed *outside* at each end of the ship in the range of the floor-heads.

In order to ascertain the condition of the upper deck beam ends, a strake of deck next the waterways on each side to be taken up except where it is covered by a poop or a forecastle; and where this exception arises the strake should be removed as far aft as the first beam within the poop, and as far forward as the first beam within the forecastle. On the decks below, as well as on the upper deck beyond the above limits, the plank need not be removed, provided the beams be tested by boring and sounding, and be found good.

All treenails, bolts, listings, and planking, removed for the examination of the vessel's condition, to be from such parts as the Surveyors may direct.

All yellow metal bolts to be tested where practicable, to ascertain if any are broken.

In the case of vessels allowed an additional year in classing for salting under Section 37, the state of the salting throughout is to be ascertained and reported upon, and, if necessary, the salt is to be renewed.

The condition of the oakum and caulking to be ascertained.

The windlass to be unhung, and its wood lining sufficiently stripped for examination.

The anchors, cables, masts, spars, and general equipment, to be attended to as prescribed in Sections 72 to 76.

The attention of the Surveyors shall then be particularly directed to the state of the upper or main deck and comings, the upper and lower deck bolts, whether of iron or copper, and the outside planks through which they pass; the planksheers, waterways, and beams, so far as they can be examined; the stem, apron, hawse-timbers, knight-heads, breast-hooks, sternpost, inner-post, and transoms; the floors and keelson; the keel, rudder, and windlass; the planking outside and inside, and the treenails; the frame and inner surface of the outside planking, where they can be seen; and the sheer and general form of the ship.

The ship to be efficiently repaired with suitable materials.

The Surveyors on these points shall transmit to the Committee a detailed report, accompanied by such observations as may occur to them, from inspection of the ship, or from information of the repairs she may have received. If, from the report of such Special Survey, the ship shall appear to be in a sound and thoroughly efficient state, the Committee shall Continue such ship on the letter A for such further period as they may think fit, not exceeding, however, *two-thirds* of the number of years which had been assigned originally, or on Restoration. No ship, however, can have a Continuation of the A Character *after Restoration*, unless the last paragraph, Section 56, or the 2nd and 3rd paragraphs of Section 57, be complied with.

If, however, at the time of the above Survey, or at any time during the term of Continuation, the ship be *diagonally* doubled, and the other requirements be complied with, according to Section 68, then, in case of ships built of wood materials of the 5 years' grade and under, they will be allowed 2 years additional on account of such diagonal doubling; those built of materials exceeding the 5 and under 12 years' grade will be allowed 3 years additional; and those built of 12 years' materials and upwards, 4 years additional.

If such extended term be given for the doubling, the materials used in the repairs must be equal in grade to those required in the original construction of the ship, or she will be liable to a reduced class, regulated by the Mixed Material Rule, Section 34.

SURVEY No. 3.

FURTHER CONTINUATION OF SHIPS CLASSED A.

For the purpose of holding such Survey, the ship must be placed in dry dock, or laid on blocks upon ways, so that the keel may be examined.

All sheathing (wood or metal) to be entirely stripped off the bottom and elsewhere.*

All the outside planking from the light water-mark upwards, including the plank sheers and waterways, to be scraped or dubbed bright.

The hold to be cleared, and proper stages made both inside and outside.

All air-courses and the limbers to be cleared.

The condition of the timbers of the frame to be further ascertained by the removal of planking equal to one strake fore and aft on each side above the wales; and a short plank in each buttock. In addition, a strake of planking to be removed, or a new listing of sufficient breadth not less than four inches, all fore and aft on each side in the ceiling above the floor heads; or, if the Shipowner should prefer it, a strake of planking may be removed outside at the same height.

One treenail to be driven out from every alternate frame or fourth timber between the upper edge of the wales and the light water-mark, and at such other parts of the topsides and bottom as the Surveyors may direct, so as to enable a judgment to be formed as to the general state of the treenails and the timbers and planking in the treenail holes.

Bolts, if of iron, in number not less in any case than six on each side, in the range of each tier of beams to be driven out in ships of 500 tons and under, and increased in number in proportion to the size of the ship.

If the fastenings in the range of the lower deck be *of iron, not through the outside planking,* one plank on either side is to be removed, so that the condition of the fastenings may be ascertained; if they are not in a satisfactory condition, the vessel must be through bolted in these parts, as the Surveyors may direct.

* If the ship has been sheathed with wood over felt, within a period of five years, and the plank shall, when so sheathed, have been brightened, and the condition of the bolts, planking, treenails, and caulking ascertained and favourably reported upon by the Surveyors, the stripping of the wood sheathing may, on application to the Committee, be dispensed with, provided that the sheathing which covers the binding-bolts and raft-ports, and a strake of sheathing all fore and aft on each side under the wales be removed, and listing of sheathing be cut out at hood ends; and the planking, fastenings, and caulking so exposed, shall prove to be in good condition; but, whenever it is removed, the outside planking is to be scraped or dubbed bright, and examined as prescribed by the above Rule.

Where the middle line bolts are of iron, their condition is to be ascertained; but, if this be not practicable, additional bolts of sufficient size must be driven through the keelson, floors, and keel in each alternate frame, also through the stem, apron, sternpost, and deadwood.

In order to ascertain the condition of the upper deck beam ends, a strake of deck next the waterways on each side to be taken out, except where it is covered by a poop or a forecastle; and, where this exception arises, the strake should be removed as far aft as the first beam within the poop, and as far forward as the first beam within the forecastle. On the decks below, as well as on the upper deck beyond the above limits, the plank need not be removed, provided the beams be tested by boring and sounding, and be found good.

All treenails, bolts, listings, and planking, removed for the examination of the vessel's condition, to be from such parts as the Surveyors may direct.

All yellow metal bolts to be tested when practicable, to ascertain if any are broken.

In the case of vessels allowed an additional year in classing for salting under Section 37, the state of the salting throughout is to be ascertained and reported upon, and, if necessary, the salt is to be renewed.

The condition of the oakum and caulking to be ascertained.

The windlass to be unhung, and its wood lining sufficiently stripped for examination.

The anchors, cables, masts, spars, and general equipment, to be attended to as prescribed in Sections 72 to 76.

The attention of the Surveyors shall then be particularly directed to the state of the upper or main deck and comings, the upper and lower deck bolts, whether of iron or copper, and the outside planks through which they pass; the planksheers, waterways and beams, so far as they can be examined; the stem, apron, hawse-timbers, knight-heads, breast-hooks, sternpost, inner-post, and transoms, the floors and keelson, the keel, rudder, and windlass; the planking outside and inside, and the treenails; the frame and inner surface of the outside planking, where they can be seen; and the sheer and general form of the ship.

The ship to be efficiently repaired with suitable materials.

The Surveyors on these points shall transmit to the Committee a detailed report, accompanied by such observations as may occur to them, from inspection of the ship, or from information of the repairs she may have received. If, from the report of such Special Survey, the ship shall appear to be in a sound and thoroughly efficient state, the Committee shall Continue such ship on the letter A for such further period as she may be eligible, not exceeding, however, *one-third* of the number of years which had been assigned originally, such further Continuation to date from the expiration of the term of Continuation assigned under the Second Survey.

If, however, at the time of the above Survey, or at any time during the term of Continuation, the ship be *diagonally* doubled, and the other requirements be complied with, according to Section 68, then, in case of ships built of wood materials of the 5 years' grade and under, they will be allowed 2 years additional on account of such diagonal doubling; those built of materials exceeeding the 5 and under 12 years' grade will be allowed 3 years additional; and those built of 12 years' materials and upwards, 4 years additional.

If such extended term be given for the doubling, the materials used in the repairs must be equal in grade to those required in the original construction of the ship, or she will be liable to a reduced class, regulated by the Mixed Material Rule, Section 34.

RESTORATION OF SHIPS TO THE CHARACTER A.

Section 55. If at *any age* of a vessel the Owner be desirous to have his ship Restored to the A character, such Restoration will be granted for a period not exceeding *one-half* of the term originally assigned, the same to be calculated from the date of such repairs; provided that a special survey as hereafter described be held by two Surveyors, one of them to be an exclusive Officer of the Society, and that all repairs found necessary be completed to their satisfaction.

If, at the expiration of such Restoration, the Owner be desirous to have his ship again Restored, she must be subjected to the requirements of the second Rule for Restoration.

REQUISITES FOR RESTORATION.—FIRST RULE.*

Section 56. The ship must be placed in dry dock, or laid on blocks upon ways, so that the keel may be examined.

All sheathing (wood and metal) to be entirely stripped off the bottom and elsewhere.

All the outside planking from the light water-mark upwards, including the waterways, poop and forecastle, planksheers, the stem, knight-heads and hawse-timbers, and the sternpost and rudder, where exposed; also the shelves, clamps, hold-beams, waterways, all inside planking, and the keelson to be scraped or dubbed bright.

The hold to be cleared, and proper stages made both inside and outside.

All air-courses and the limbers to be cleared. The condition of the timbers of the frame to be further ascertained by the removal of one strake of topside planking all fore and aft on each side.

In addition, a plank to be removed in each bow and each buttock.

In all cases the outside planks through which the chain and preventer bolts pass, must be removed.

In flush-decked ships all the plank sheer and spirketting to be removed, but in ships having a poop or top-gallant forecastle it will only be necessary to remove the plank sheer and spirketting between these, and the mouldings in continuation of the plank sheer forward and aft, or a portion of topside planking extending from the fore part of the poop aft, and from the after part of the top-gallant forecastle forward.

One treenail to be driven out from every alternate frame or fourth timber between the upper edge of the wales and the plank sheer, and one from every alternate frame or fourth timber between the upper edge of the wales and the light water-mark, also one to be driven out from every fourth timber for half the vessel's length amidships on each side at the bilge, and at such other parts of the vessel as the Surveyors may direct, in order that the state of the treenails, and the timbers and planking in the treenail holes, may be ascertained.

Bolts, if of iron, in number not less in any case than six on each side, in the range of each tier of beams, to be driven out in ships of 500 tons and under, and increased in number in proportion to the size of the ship.

If the fastenings in the range of the lower deck be of *iron not through the outside planking*, one plank on each side is to be removed, so that the condition of these fastenings may be ascertained; if they are not in a satisfactory condition, the vessel must be through-bolted in these parts as the Surveyors may direct.

* In the case of Restoration of ships previously doubled, or ships of peculiar construction, special application may be made to the Committee.

Where the middle-line bolts are of iron, their condition is to be ascertained; but, if this be not practicable, additional bolts of sufficient size must be driven through the keelson, floors, and keel, in each alternate frame, also through the stem, apron, sternpost, and deadwood.

A strake of ceiling to be removed all fore and aft, in the range of the first futtock-heads, or at such height forward and aft as may, in the judgment of the Surveyors, best expose the timbers of the frame and chocks to view.

One plank of ceiling on each side at the floor-heads to be removed.

In order to ascertain the condition of the deck beam ends, a strake of deck next the main or inner waterway to be removed from each tier of beams, excepting that, in ships having a poop or a top-gallant forecastle, the upper deck need not be removed abaft the first beam within the poop, or before the first beam within the forecastle; provided the remainder of the upper deck beams under the poop and forecastle be tested by boring and sounding, and be found good.

All treenails, bolts, listings, and planking, removed for the examination of the vessel's condition, to be from such parts as the Surveyors may direct.

All yellow metal bolts to be tested, where practicable, to ascertain if any are broken.

In the case of vessels allowed an additional year in classing for salting under Section 37, the state of the salting throughout is to be ascertained and reported upon, and, if necessary, the salt is to be renewed.

The condition of the oakum and caulking to be ascertained.

The windlass to be unhung, and its wood lining sufficiently stripped for examination.

The anchors, cables, masts, spars, and general equipment to be attended to as prescribed in Sections 72 to 76.

When in the state above described, the ship is to be submitted to a special survey and examination, at which the attention of the Surveyors is to be particularly directed to the state of the upper or main deck and comings, the upper and lower deck bolts, whether of iron or copper, and the planks through which they pass; the waterways and beams so far as they can be examined; the stem, apron, hawse-timbers, knight-heads, breast-hooks, sternpost and transoms; the floors, keelson, and keel; the rudder and all its parts and hangings; the planking outside and inside, and the treenails; the frame and inner surface of the outside planking, where they can be seen; and the sheer and general form of the ship.

If, after the above examination, the Owner should consent to take out all planks, timbers, beams, knees, waterways, fastenings, and other parts that may be found defective, or objected to, and replace them with materials of the same species, or of equal quality to that required in vessels of two-thirds the number of years (by their timber material) of the ship's original construction, then such ships to be entitled to be Restored for a period not exceeding *one-half* the number of years originally assigned.

If, however, in addition to the above, or at any time during the term of Restoration, the ship be *diagonally* doubled, according to Section 68, then in the case of ships built of the 5 years' grade and under, 2 years additional will be allowed; if built of materials exceeding the 5 and under the 12 years' grade, 3 years additional; and if of 12 years' material, 4 years additional will be allowed.*

Ships Restored, to be subject to annual survey, and also to a half-time survey, as prescribed in Section 34.

* *As regards ships which have already had a prolonged term for doubling,* see *Section* 68.

Ships of 300 tons or above, Restored according to the foregoing Rule, will not be allowed a Continuation of the Character A at the expiration of the Restoration, unless they be diagonally doubled as prescribed in Section 68. But if they be under 300 tons, and exceeding 20 years of age, to be allowed a Continuation, the bottom planking must either be doubled, as prescribed in Section 68, or else renewed for half the length amidships from the second futtock-heads to the keel, in addition to the other requirements of Section 54.

SECOND RULE.

Section 57. If, at any age of a vessel, the owner be desirous to have his ship Restored to the A character for a longer period than one-half her original classification, she must be subjected to the Special Survey hereafter described, to be held by two Surveyors, one of them to be an exclusive Officer of the Society, and all repairs found necessary must be completed to their satisfaction.

If the vessel be 300 tons or above, she must be diagonally doubled, as per Section 68, unless the whole of the planking from the keel to the height of the second futtock-heads be renewed,* when the doubling may be dispensed with.

But if she be under 300 tons, and exceeding twenty years of age, she must have the bottom planking renewed * for one-half the length amidships from the second futtock-heads to the keel, or be diagonally doubled, as per Section 68.

Vessels which have undergone this rule will be entitled to be Restored for a period not exceeding two-thirds the number of years originally assigned (exclusive of any period which might have been previously assigned for doubling), and in addition, if the vessel be at this time diagonally doubled, in accordance with the Rules, Section 68, the term prescribed for such doubling will be allowed.†

When extensive repairs are effected under this rule, and a large proportion of low class materials has been removed and replaced by wood of a higher grade, then, if additional fastenings have been introduced, and the workmanship is of a superior description, the vessel will receive the same consideration with a view to assigning her an improved Class under the Mixed Material Rule, Section 34, as in ships on their original construction.

REQUISITES FOR RESTORATION.—SECOND RULE.‡

Section 58. The ship must be placed in dry dock or laid on blocks upon ways, so that the keel may be examined.

All sheathing (wood and metal) to be entirely stripped off the bottom and elsewhere.

The hold to be cleared, and proper stages made both inside and outside.

* If the whole of the ceiling from the bilges downwards has been removed, and the edges of the outside planking, and its general condition be found satisfactory, or if the outside planking shall have been recently renewed, the Committee will be prepared to give consideration to any application that may be made to them for a relaxation of the requirements above stated.

† In the case of Restoration of ships previously doubled, or ships of peculiar construction, special application may be made to the Committee.

‡ If the vessel be *Salted* in accordance with Section 37 during repairs under the Second Rule for Restoration, she will be allowed the advantage of the Rule for Salting.

All the outside planking from the lower part of the chocks at floor-heads upwards, the stem, knight-heads, hawse-timbers, sternpost, and rudder where exposed; also the shelves, clamps, bilge planks, ceiling, and keelsons, to be scraped or dubbed bright.

All air-courses and the limbers to be cleared.

The upper deck waterways, spirketting, planksheers, sheerstrakes, and topside planks, through which the upper deck shelf lodging-knee and waterway bolts pass, to be removed.

Two planks in each bow and each buttock to be removed.

In all cases, the outside planks through which the chain and preventer bolts pass must be removed.

If the bolts in the range of the lower deck be *iron*, the outside planks through which they pass must be removed.

One treenail to be driven out from every alternate frame or fourth timber between the upper edge of the wales and the planksheer, and one from every alternate frame or fourth timber between the upper edge of the wales and the light water-mark, also one to be driven out from every fourth timber, for half the vessel's length amidships on each side at the bilge, and at such other parts of the vessel as the Surveyors may direct, in order that the state of the treenails and the timbers and planking in the treenail holes may be ascertained.

If the fastenings in the range of the lower deck be of *iron, not through the outside planking*, one plank on each side is to be removed, so that the condition of these fastenings may be ascertained; if they are not in a satisfactory condition, the vessel must be through-bolted in these parts as the Surveyors may direct.

Where the middle line bolts are of iron, their condition is to be ascertained; but, if this be not practicable, additional bolts of sufficient size must be driven through the keelson, floors, and keel in each alternate frame, also through the stem, apron, sternpost, and deadwood.

Two strakes of ceiling in the range of the first futtock-heads, and one strake in the range of the floor-heads, to be removed on each side all fore and aft.

A strake of upper deck plank next the hatchways to be removed all fore and aft.

A strake of deck next the waterway or spirketting, on the hold or lower deck beams, to be removed.

All treenails, bolts, listings, and planking, removed for the examination of the vessel's condition, to be from such parts as the Surveyors may direct.

All yellow metal bolts to be tested where practicable, to ascertain if any are broken.

In the case of vessels allowed an additional year in classing for salting under Section 37, the state of the salting throughout is to be ascertained and reported upon, and, if necessary, the salt is to be renewed.

The condition of the oakum and caulking to be ascertained.

The windlass to be unhung, and its wood lining sufficiently stripped for examination.

The anchors, cables, masts, spars, and general equipment to be attended to as prescribed in Sections 72 to 76.

When in the state above described, the ship to be submitted to a special survey and examination, at which the attention of the Surveyors is to be particularly directed to the state of the upper deck and comings, the upper and lower deck binding bolts, whether of iron or copper, and the planks through which they pass; the beams, stem, apron, hawse-timbers, knight-heads, breast-hooks, sternpost, inner-post, and transoms; the floors, keelson and keel; the rudder and all its parts and hangings; the planking outside and inside and the treenails; the frame and inner surface of the outside planking, where they can be seen; and the sheer and general form of the ship.

If, after the above examination, the Owner should consent to take out all planks, timbers, beams, knees, fastenings, and other parts that may be found defective, or objected to, and replace them with materials of the same species, or of equal quality *to that required in vessels of two-thirds the number of years (by their timber material) of the ship's original construction,* and she be *diagonally doubled* as per Section 68, *or planking renewed as required by Section* 57, then she will be entitled to be Restored for a period not exceeding two-thirds the number of years assigned originally, and the term allowed for doubling, viz., 2 years additional if built of wood materials of the 5 years' grade and under; 3 years additional, if built of materials exceeding the 5 years' and under the 12 years' grade; and 4 years additional, if built of 12 years' materials or above.

Ships thus Restored to be subject to annual survey, and to the half-time survey, as prescribed in Section 34.

CONTINUATION ON RESTORATION.

Section 59. Ships which have been doubled when *Restored* (or in which the requirements of the last paragraph, Section 56, or the second and third paragraphs of Section 57, have been complied with) shall be entitled to Continuation, subject to the same conditions of survey and examination as are prescribed for ships proposed to be Continued at the expiration of the period first assigned to them (Section 54); but, in like manner, the term of such extended Continuation shall be limited to a period not exceeding one-third or two-thirds of the number of years for which the ships may respectively have been *Restored* (exclusive of time allowed for doubling), without any reference whatever to the period originally assigned to them.

EXPIRATION OF CHARACTER.

At the termination of the several periods assigned to ships for remaining on the Character A, or A in Red, they will have the word "*Expired*" inserted against them; and, if not surveyed prior to the reprinting of the Register Book, they will appear without any character.*

But if, during the *last year* of the period assigned to them, the Owners of a ship shall, in consequence of her being about to proceed on a distant foreign voyage, apply to have her surveyed for Continuation on the letter A, or for the Character A in Red, a special survey shall be held conformably to the Rules, Section 54 or 60, as the case may be; and if, from the report of such Special Survey, the ship shall appear to be in all respects in a sound and efficient state, such as is required by those Rules, the Committee shall, from the period at which the ship's character would terminate, continue her on the letter A, or will assign to her the Character A in Red in accordance with the Rules referred to.

* The terms of years assigned to ships on the Character A, launched *previously to the 1st July,* 1859, also of ships launched during the *first* six months of the years 1860, 1861, 1862, and 1863, will expire on the 31st December of the last year of the periods assigned to them respectively.

The terms assigned to ships launched during the *last* six months of the years 1859, 1860, 1861, and 1862, will expire on the 30th June next after the last year of the periods assigned to them respectively.

In the case of ships launched on and after the 1st July, 1863, the period originally assigned to them on the A character, will in every case *date from the month* in which the vessel may be launched, and will expire at the end of the corresponding month in the year at which the period assigned terminates.

SHIPS CLASSED A, IN RED.

Section 60. Ships found on survey to be of a superior description, being fit for the safe conveyance of dry and perishable goods to and from all parts of the world, subject to the following conditions, shall be classed A in Red, as the Second description of the First class.

In all cases in which the Owner may claim this character, the ship must undergo a special survey by two Surveyors (to be appointed in every instance by the Committee), one of whom shall be an exclusive Officer of the Society. (*See* also Section 52 for Ships not built under Survey.)

Then if the following Survey, designated Survey No. 1, be complied with within twelve months of the expiration of the Character A, either on original Classification, Continuation, or Restoration, one-third of the number of years assigned originally, or such as might have been assigned, will be granted from the date of such Survey; *but, if this survey be not complied with within the above stated time, the period named will commence from the expiration of the original Classification, Continuation, or Restoration.*

If after the expiration of the period assigned, or which might have been assigned, under the FIRST *survey, the character* A *in red be sought, the following Survey, designated No. 2, must be complied with, when a period of two-thirds the number of years assigned originally, or such as might have been assigned, will be granted from the date of such Survey.*

The character A *in red for a period of two-thirds the number of years originally assigned may, however, be obtained at* ANY *time, provided the requirements of Survey No. 2 be complied with.*

In the repair of vessels for the above character, no materials may be used of a description inferior to those allowed in new ships for the six years' grade, except in the case of vessels originally classed for a shorter period than six years, when materials equal to those used in the original construction will be permitted.

FIRST SURVEY FOR A, IN RED.

The ship must be either placed in dry dock, or laid on blocks upon ways, so that the keel may be examined.

To be scraped or dubbed bright from the light water-mark upwards, including the plank sheers and waterways, so as to expose the surface of the plank to view.*

The hold to be cleared, and proper stages to be made both inside and outside.

All air-courses and the limbers to be cleared.

The condition of the timbers of the frame to be further ascertained by a *new* listing not less than 4 inches wide, being *cut* out of the ceiling at each end of the hold on each side, between the keelson and air-course under the hold-beam clamp, for one-fifth the entire length of the ship.

* If the ship has been sheathed with wood over felt within a period of five years, and the plank from the light water-mark upwards shall, when so sheathed, have been brightened, and the condition of the bolts, planking, treenails, and caulking ascertained, and favourably reported upon by the Surveyors, the stripping from the light water-mark upwards may, on application to the Committee, be dispensed with, provided that the sheathing which covers the raft-ports and binding-bolts, and a strake of sheathing all fore and aft on each side under the wales be removed, and listings of sheathing be cut out at hood ends, and the planking, fastenings, and caulking so exposed shall prove to be in good condition; but, whenever the sheathing is removed, the outside planking is to be scraped or dubbed bright and examined as prescribed by the above Rule.

If the ship has been sheathed with metal within a period of two years, and it shall appear to the Surveyors that stripping from the light water-mark upwards may be dispensed with, the case will receive due consideration on application to the Committee.

One treenail to be driven out from every alternate frame or fourth timber between the upper edge of the wales and the planksheers, and one from every alternate frame or fourth timber between the upper edge of the wales and the light water-mark, and at such other parts of the bottom as the Surveyors may direct, so as to enable a judgment to be formed as to the general state of the treenails, and the timbers, and planking in the treenail holes.

Bolts, if of iron, in number not less in any case than six on each side, in the range of each tier of beams to be driven out in ships of 500 tons and under, and increased in number in proportion to the size of the ship.

If the fastenings in the range of the lower deck be *of iron, not through the outside planking*, one plank on either side is to be removed, so that the condition of the fastenings may be ascertained; if they are not in a satisfactory condition, the vessel must be through-bolted in these parts, as the Surveyors may direct.

All treenails, bolts, and listings, removed for the examination of the vessel's condition, to be from such parts as the Surveyors may direct.

Where the middle line bolts are of iron, their condition is to be ascertained; but, if this be not practicable, additional bolts of sufficient size must be driven through the keelson, floors, and keel in each alternate frame, also through the stem, apron, sternpost, and deadwood.

All yellow metal bolts to be tested where practicable, to ascertain if any are broken.

In the case of vessels allowed an additional year in classing for salting under Section 37, the state of the salting throughout is to be ascertained and reported upon, and, if necessary, the salt is to be renewed.

The condition of the oakum and caulking to be ascertained.

The windlass to be unhung, and its wood lining sufficiently stripped for examination.

The anchors, cables, masts, spars, and general equipment to be attended to as prescribed in Sections 72 to 76.

The attention of the Surveyors shall then be particularly directed to the state of the upper or main deck and comings; the upper and lower deck bolts, whether of iron or copper, and the planks through which they pass; the planksheers, waterways, and beams, so far as they can be examined; the stem, apron, hawse-timbers, knight-heads, breast-hooks, sternpost, inner-post, and transoms; the floors, keelsons, and keel; the rudder and windlass; the planking outside and inside and the treenails; the frame and inner surface of the outside planking, where they can be seen; and the sheer and general form of the ship.

The ship to be efficiently repaired with suitable materials.

The term for which a vessel may be assigned the Character A in Red, upon a compliance with the foregoing requirements, will not exceed one-third the number of years of that assigned originally, or such as might have been assigned, subject to the usual annual survey, and also to the half-time survey, as prescribed in Section 34.

If, however, in addition to the above, the ship be *diagonally* doubled according to Section 68, then, in the case of ships built of wood materials of the 5 years' grade and under, they will be allowed 2 years additional on account of such diagonal doubling; those built of materials exceeding the 5 and under the 12 years' grade, will be allowed 3 years additional; and those built of 12 years' materials and upwards 4 years additional,* provided a strake all fore and aft at the upper edge of the doubling, or the planksheers, be removed.

* *In the case of ships previously doubled, or ships of peculiar construction, special application may be made to the Committee.*

SECOND SURVEY FOR A, IN RED.

For the purpose of holding such Survey, the ship must be placed in dry dock, or laid on blocks upon ways, so that the keel may be examined. (*See also* Section 52 for ships not built under Survey.)

All sheathing (wood and metal) to be entirely stripped off the bottom and elsewhere.*

All the outside planking, from the light water-mark upwards, including the plank sheers and waterways, to be scraped or dubbed bright.

The hold to be cleared, and proper stages made both inside and outside.

All air-courses and the limbers to be cleared.

The condition of the timbers of the frame to be further ascertained by the removal of all the treenails in one strake in the topsides fore and aft, on each side, and by the removal of two planks on each side above the wales (except in vessels of 200 tons, or under, when the removal of *one* plank on each side will be deemed sufficient).

In addition, a plank to be removed in each bow and each buttock.

One treenail to be driven out from every alternate frame or fourth timber, between the upper edge of the wales and the light water-mark, and at such other parts of the topsides and bottom as the Surveyors may direct, so as to enable a judgment to be formed as to the general state of the treenails, and the timbers and planking in the treenail holes.

If the whole of the treenails from the light water-mark upwards have to be renewed, the removal of a plank in each bow and buttock will be sufficient, provided the timbers in the treenail holes be examined and found in good condition.

Bolts, if of iron, in number not less in any case than six on each side, in the range of each tier of beams to be driven out in ships of 500 tons and under, and increased in number in proportion to the size of the ship.

If the fastenings in the range of the lower deck be *of iron, not through the outside planking*, one plank on either side is to be removed, so that the condition of the fastenings may be ascertained; if they are not in a satisfactory condition, the vessel must be through-bolted in these parts, as the Surveyors may direct.

Where the middle-line bolts are of iron, their condition is to be ascertained; but, if this be not practicable, additional bolts of sufficient size must be driven through the keelson, floors, and keel in each alternate frame, also through the stem, apron, sternpost, and deadwood.

Plank, or a *new* listing of ceiling, of sufficient breadth (not less than four inches wide), at the discretion of the Surveyor, to be cut out of the ceiling in the range of the floor-heads, or at such height as may in the judgment of the Surveyors best expose the timbers of the frame to view, at each end of the hold for one-fifth the entire length of the ship, and for the remaining three-fifths of the ship's length the state of the timbers to be ascertained by driving out a treenail from every fourth timber in one or other of the strakes of the bilge

* If the ship has been sheathed with wood over felt, within a period of five years, and the plank shall, when so sheathed have been brightened, and the condition of the bolts, planking, treenails, and caulking ascertained and favourably reported upon by the Surveyors, the stripping of the wood sheathing may, on application to the Committee, be dispensed with; provided that the sheathing, which covers the binding-bolts and raft-ports, and a strake of sheathing all fore and aft on each side under the wales be removed, and listing of sheathing be cut out at hood ends; and the planking, fastenings, and caulking so exposed shall prove to be in good condition; but, whenever it is removed, the outside planking is to be scraped or dubbed bright, and examined as prescribed by the above Rule.

planking. If the Shipowner should prefer it, planking may be removed *outside*, at each end of the ship, in the range of the floor-heads.

In order to ascertain the condition of the upper deck beam ends, a strake of deck next the waterways on each side to be taken out, except where it is covered by a poop or a forecastle, and where this exception arises the strake should be removed as far aft as the first beam within the poop, and as far forward as the first beam within the forecastle. On the decks below, as well as on the upper deck beyond the above limits, the plank need not be removed, provided the beams be tested by boring and sounding and be found good.

All treenails, bolts, listings, and planking removed for the examination of the vessel's condition, to be from such parts as the Surveyors may direct.

All yellow metal bolts to be tested where practicable, to ascertain if any are broken.

In the case of vessels allowed an additional year in classing for salting under Section 37, the state of the salting throughout is to be ascertained and reported upon, and, if necessary, the salt is to be renewed.

The condition of the oakum and caulking to be ascertained.

The windlass to be unhung, and its wood lining sufficiently stripped for examination.

The anchors, cables, masts, spars, and general equipment to be attended to as prescribed in Sections 72 to 76.

The attention of the Surveyors shall then be particularly directed to the state of the upper or main deck and comings; the upper and lower deck bolts, whether of iron or copper, and the planks through which they pass; the planksheers, waterways, and beams, so far as they can be examined; the stem, apron, hawse-timbers, knight-heads, breast-hooks, sternpost, inner-post, and transoms; the floors, keelsons, and keel; the rudder and windlass; the planking outside and inside, and the treenails; the frame and inner surface of the outside planking, where they can be seen; and the sheer and general form of the ship.

The ship to be efficiently repaired with suitable materials.

To entitle them to continue this Character, such ships will be required, in addition to the usual annual survey, to undergo the half-time survey as prescribed in Section 34, and to undergo a special re-survey as prescribed above, within a period (from the date of the last special re-survey) not exceeding *two-thirds* of the several terms of years originally assigned to them, or earlier, if, in the judgment of the Surveyors, upon a careful examination of the ship, the same shall appear to them to be necessary.

If, however, in addition to the above, the ship be *diagonally* doubled, and the other requirements be complied with, according to Section 68, then, in case of ships built of wood materials of the 5 years' grade and under, they will be allowed 2 years additional on account of such diagonal doubling; those built of materials exceeding the 5 and under the 12 years' grade, will be allowed 3 years additional; and those built of 12 years' materials and upwards, 4 years additional.*

SHIPS CLASSED Æ.

Section 61. Ships that have passed the prescribed age for the A Character, but have not undergone the repairs which would have entitled them to be Continued or Restored; or having been Continued or Restored, or classed A in Red, and the additional period thus assigned expired, and also such ships as have never had an original character, which shall be found on survey fit for the conveyance of dry and perishable goods on

* In the case of ships previously doubled, or ships of peculiar construction, special application may be made to the Committee.

shorter voyages, and for the conveyance of cargoes not in their nature subject to sea-damage *on any voyage*, shall be distinguished by the diphthong Æ, upon compliance with the undermentioned Survey. (*See* also Section 52 for Ships not built under Survey.)

SURVEY.

The ship to be placed on blocks, so that the keel and bottom may be seen and properly examined and the caulking tested.

The hold to be cleared and proper stages made both inside and outside.

The limbers and all air-courses to be cleared.

A listing to be cut out of the ceiling, not less than four inches wide, in the range of the floor-heads or at such height as may, in the judgment of the Surveyors, best expose the timbers of the frame to view, at each end of the hold on each side for one-fifth the extreme length of the vessel.

The outside planking to be scraped bright where the Surveyors may consider it to be necessary from any apparent defect.

Bolts of lower deck (if of iron) in number not less than six on each side, and treenails in number not less than twelve on each side, to be driven out at various parts of the ship.

The attention of the Surveyors is to be then particularly directed to the state of the upper or main deck and comings, the upper and lower deck bolts, *whether of iron or copper*, and the outside planks through which they pass, and to all other parts of the ship, so far as they can be examined.

The windlass to be unhung and its wood lining sufficiently stripped for examination; and the chain cables to be removed from the lockers and ranged, and, with the anchors, masts, spars, and general equipment, examined so as to be satisfactorily reported upon.

Where the middle-line bolts are of iron, their condition is to be ascertained; but, if this be not practicable, additional bolts of sufficient size must be driven through the keelson, floors, and keel in each alternate frame, also through the stem, sternpost, and deadwood.

If the Æ Character be then assigned, it shall be continued, subject to an annual survey for a period not exceeding four years, at the expiration of which time the Character will be discontinued unless the vessel be again submitted to a similar Special Survey.*

BRITISH NORTH AMERICAN AND ALL FIR SHIPS.†

Section 62. Ships built in the British North American Colonies, and all ships wherever built, the frames of which are composed of *Fir*, of 400 tons and above, shall, in order to entitle them to be classed in the Register Book of the Society, be secured in their bilges by the application of iron knee riders, or hanging-knees and riders to cover the joints of the floor and futtock-heads, to extend from the height of the hold beams to the floors so as to receive not less than two bolts in a substantial part of the floors.

The number of iron knees and riders to be not less than one of each to every hold or lower deck beam on each side. The knees to be connected with the riders or not, at the option or convenience of the Owners,

* For doubling of ships of the above Class, *see* Section 68.

† *See also* Section 39, paragraph 5.

but if not so connected, the side arms of the knees are to be of the length and to be fastened as prescribed in Table F. "*Jumped knees*" will not be allowed.

The number of knees to each deck, and of riders, also their dimensions, and number of bolts, are fully explained in Table F.

All ships built in the Colonies will be considered as "iron fastened" in their centre lines, unless it shall be satisfactorily shown to the contrary, either by the exposure of some of the bolts or by a certificate to be produced from the Builders.

Ships which proceed to sea *without being fastened with the iron knees and riders prescribed by the Rules,* will have One Year deducted* from the period to which they would otherwise be entitled to be classed in the Register Book.

BRITISH NORTH AMERICAN BUILT SHIPS.

Section 63. All British North American built ships, which have gone, or may go off the List of Ships of the A character, or which may be of an age exceeding the period for which they might have had claims to be put upon that grade (whether classed or not), shall, as from time to time they come under examination, be subjected to a careful survey, to be made by one of the Surveyors to this Society;—and no further Character shall be assigned them unless a survey shall be held as follows; either by removing planking *outside*, equal in breadth to an entire strake, for one-fifth the length of the vessel forward and aft on both sides, or by cutting listings *inside* five inches wide to the same extent in the fore and after bodies in line with the upper turn of bilges, or at such height as may, in the judgment of the Surveyors, best expose the timbers of the frame to view, and for the remaining three-fifths of the vessel amidships the state of the timbers to be ascertained by driving out a treenail in every fourth timber in one or other strake of bilge planking. A special report of the state of these timbers, and of the general state and condition of the upper deck fastenings, waterways, spirketting, plankshеers, topsides, upper deck with its appendages, lower deck fastenings, wales, counter, plank and treenails outside to the water's edge, rudder, windlass and capstan, beams, and breast-hooks, shall then be transmitted by the Surveyors to the Committee; and on the receipt of such report the character shall be assigned.

If, in addition to the requirements contained in Section 61, *the above survey be complied with, and the* Æ *Character be assigned, it shall be continued, subject to an annual survey for a period not exceeding four years, at the expiration of which time the Character will be discontinued unless the vessel be again submitted to a similar special survey.*

SHIPS CLASSED E.

Section 64. Will comprise all ships which shall be found on Survey fit for the conveyance of cargoes not in their nature subject to sea-damage *on any voyage.*

Section 65. To entitle vessels to this Character they must be subjected to the following Survey.

To be placed on blocks so that the keel and bottom may be examined, and the caulking tested. Treenails, not less than twelve on each side, to be driven out at various parts of the ship, for the purpose of ascertaining their condition and that of the timbers and planking through which they pass.

* This applies not only to British North American ships, but to all wooden vessels.

The windlass to be examined, and the chain cables to be ranged, and the equipment generally examined and reported upon.

If the E Character be then assigned, it shall be continued, subject to an annual survey, for a period not exceeding three years, at the expiration of which time the Character will be discontinued unless the vessel be again submitted to a similar Special Survey.*

Section 66. The Classification of Ships with the Character I discontinued.

CAULKING.

Section 67. The Bottom of every ship is to be CAULKED† once in every five years, unless wood-sheathed and felted, and then once in every seven years, except in the case of *Teak-built ships*, upon which a special survey may have been requested, and the Surveyors having ascertained, by the removal of a strake of sheathing fore and aft under the wales, and a strake at the first futtock-heads, and by causing listings to be cut out at the hood ends, that such caulking is not required, the same may then be dispensed with.

If any ship shall be stripped within the periods above mentioned, her bottom is to be caulked, *if necessary*. (*See* Section 70.)

DOUBLING.

Section 68. In all cases in which ships may be doubled, doubling of not less than the thickness hereinafter mentioned will be required, the same to be properly wrought and fastened as follows: in every instance the doubling is to be at least single fastened either with treenails or with bolts,‡ and a through bolt in every butt. If treenails be used, every treenail must, if practicable, be a through fastening; and, if bolts be used, then one-sixth of them from the lower part of the bilge upwards must be through and clenched on the ceiling in addition to the butt bolts. In all cases of doubling, the rudder braces are to be removed.

The throat bolts of iron knees, and the bolts of iron hooks, crutches, and pointers, must be renewed through the doubling.

The thickness of the doubling for the wales and bottom, on ships

Under 400 tons to be not less than	2	inches
of 400 „ and under 600 tons	$2\frac{1}{2}$	„
of 600 „ and above	3	„

* For doubling of ships of the above Class, *see* Section 68.

† In cases where ships have been doubled with doubling of less thickness than is required by, or not fastened in accordance with, the Rules, it will not be imperative that such doubling be stripped at the expiration of seven years, as required for ordinary sheathing; but if, upon survey, the doubling be found in good condition, the period for its remaining on may be extended, with the sanction of the Committee, to a term not exceeding ten years, provided the doubling below the wales be copper or yellow metal fastened or treenailed.

‡ In ships hereafter doubled and sheathed with copper or yellow metal, if the doubling be fastened exclusively with bolts, the same must be of copper or yellow metal.

If the doubling be fastened with treenails and bolts, as described in the above section, and the bolts be of iron, the vessel must be subjected to a Special Survey, and bolts at the discretion of the Surveyor be driven out to ascertain their condition; such surveys to be held within periods not exceeding three years, and whenever the copper or yellow metal sheathing is stripped.—*6th July*, 1876.

On the topsides of ships not exceeding 300 tons, the thickness may be 1½ inches.

No ship hereafter doubled shall be entitled to the Character A, or A in Red, unless at the time of doubling it be ascertained, in either case, that the frame is capable of securely retaining the fastenings, *by one treenail being driven out in every alternate frame or fourth timber between the upper edge of the wales and the light water-mark, and at such other parts of the bottom as the Surveyors may direct, so as to enable a judgment to be formed as to the general state of the treenails and timbers, and of the planking in the treenail holes,* or should the state of the treenails indicate defective timbers, or should the outside planking be bolt-fastened, then, by cutting out listings or plank at the discretion of the Surveyor.

Before doubling, the original fastenings in the outside planking and the rider bolts should be ascertained to be in efficient condition, or be made good, but all treenails, from *the upper part of chocks at second futtock-heads to the lower part of chocks at floor-heads to be renewed with through treenails of hard wood for at least half the length of the ship amidships,* unless the Surveyors, by having a sufficient number driven out, fully satisfy themselves that they are well made, tightly driven, and in good condition.

DIAGONAL DOUBLING.

If the doubling be applied diagonally, on the wales and bottom, it will be allowed to be of the following thicknesses, viz. :—

In ships under 500 tons	... ...	1½ inches
,, of 500 tons and under 1,000 tons	... ...	2 ,,
,, 1,000 tons and upwards	... ...	2½ ,,

Diagonal doubling on ships is to be fastened as under, viz. :—

If worked not above 11 inches broad, it may be single fastened with a through bolt at every butt, every *fifth* fastening to be a through bolt or a through treenail of hard wood; the distance between these through fastenings not to exceed 4 ft. 6 in. The remaining fastenings to consist of through treenails or two long and two short dump bolts; the length of the short dumps may be half an inch less than the combined thickness of the doubling and the original outside plank, and that of the long dumps to be not less than the thickness of the doubling added to twice the thickness of the original outside plank.

At the upper edge of the doubling, which is to be sufficiently high to enable the butt bolts of the diagonal planks to pass through the lower deck spirketting, a strake of planking is to be taken out fore and aft, and a strake is to be worked in its place, on the timbers, sufficiently thick to project to the outside of the doubling. The butts of the diagonal doubling are then to be rabbeted into this thick strake; or a fore and aft strake of doubling may be worked below the thick strake, and be rabbeted into it, and the butts of the diagonal doubling may be butted against this fore and aft strake. Or, if the strake of planking is not removed and the thick strake is not worked, there must be at the upper ends of the diagonal doubling a fore and aft strake, having its upper edge let into the original plank sufficient to form a caulking seam, say not less than 1½ inches. The lower ends of the diagonal doubling to be worked against two strakes of fore and aft doubling, the lower edge of the lower strake being rabbeted into the keel, and to be not less in thickness than one and a half times the thickness of the doubling. All diagonal doubling to be of rock elm or of equally suitable material, and be wrought on hair felt.

EXTENSION OF CLASS FOR DIAGONAL DOUBLING.

Ships diagonally doubled in conformity with the Rules, after the expiration of twelve months from the date of launching, shall be allowed an extended period of classification to the extent described hereafter.

Also ships surveyed for Continuation, Restoration, and the Character A 1 in Red, which shall be diagonally doubled in conformity with the Rules, shall, on account of such doubling, be allowed an extension of the term otherwise assigned to them as under, viz.:—

Ships built of wood materials of the 5 years' grade and under, shall be allowed 2 years additional on account of being doubled diagonally; those built of materials exceeding the 5 and under the 12 years' grade, shall be allowed 3 years additional; and those built of 12 years' materials, 4 years additional.

To entitle ships to the advantages of this Rule when surveyed for Continuation, under Survey No. 2, Section 54, or for A in Red under Second Survey, Section 60, it will be necessary, in addition to the other requirements of the Rules, that in *flush-decked Vessels* the plankshеer be removed on each side all fore and aft, so as to expose the heads of the timbers and the back of waterways to view; also that a strake of upper deck next the waterway be taken out all fore and aft, and the beams of the decks below be tested by boring and sounding. But in ships having a poop and forecastle it will be necessary to remove the plankshеer on both sides from the poop to the forecastle, and the mouldings in continuation of the plankshеer forward and aft; or a portion of a strake of topside planking from the fore part of the poop aft, and from the after part of the forecastle forward; but it will not be necessary to remove planking of topsides from poop to forecastle where the plankshеer has been removed, if the timbers thus exposed are in good condition; nor the strake of deck abaft the first beam within the poop and before the first beam within the forecastle, provided the beams are tested by boring and sounding and be found good.

If a ship be doubled at the time she undergoes the Continuation Rule, 1st Survey, or the 1st Rule for A in Red, the removal of a strake all fore and aft at the upper edge of the doubling may be substituted for the removal of the plankshеer.

A similar relaxation of the Rule will, upon special application to the Committee, be allowed in the case of spar-decked Ships.

FURTHER EXTENSION OF CLASS FOR DIAGONAL DOUBLING.

Ships which have been diagonally doubled in conformity with the Rules, Section 68, and have received an extension of class for the same, may, at a subsequent period, either on the expiration of the period of continuation under the second Rule, or of Restoration, or of second continuation upon Restoration, or second survey for A 1 in red, receive a *further extension* of class for diagonal doubling, provided the following survey be complied with, and the vessel be found or placed in good and efficient condition.

The period of this *further extension* to be 3 years in the case of vessels built of materials of the 12 years' grade and above, and 2 years in the case of vessels where the timber materials are below the 12 years' grade.

SURVEY.

The ship to be placed on blocks in dry dock, or on ways, so that the keel and bottom may be seen and properly examined (unless she has been thus surveyed by the Society's officers within the previous twelve

months); the hold to be cleared, and proper stages made both inside and outside; the limbers, and all air-courses to be cleared; and, if the ship has not already got the air-courses described in Section 37, they are now to be made; the outside planking to be scraped bright where the Surveyors may consider it to be necessary from any apparent defects; bolts of lower deck (if through of iron) in number not less than three on each side, and treenails in number not less than twelve on each side, to be driven out at various parts of the ship, and all parts of the ship, and the equipment to be thoroughly examined, in order to ensure the vessel being in good and efficient condition and worthy of the extension of class herein contemplated.

Such ships to be marked in the Register Book thus:—dia. d. 3 yrs. or 2 yrs., as the case may be.

DOUBLING OF VESSELS CLASSED Æ and E.

All vessels of the Æ or E class, or vessels unclassed, which may be found on survey to be, from *local* defects, in a condition requiring considerable opening out and consequent repairs, to entitle them to a class in the Register Book, or to continue on their class, may be rendered eligible for classification, or for the Æ character, provided they be diagonally doubled, the thickness of the same being from one inch in thickness and upwards, according to the size of the vessel.

In all such cases, however, the Local Surveyor should forward a Report, setting forth the condition of all parts of the vessel, and the mode of doubling proposed to be adopted, for the sanction of the Committee.

A careful examination is to be made of the condition of the original fastenings, and the planking of the bottom, &c., before the doubling is fitted, and the Surveyors are to satisfy themselves that the timbers of the frame and planking are sufficiently sound to receive the fastenings.

When the doubling is under two inches in thickness it may be fastened with short bolts, spikes or nails, galvanized, on the alternate edges not exceeding twelve inches apart; the length of the bolts, spikes or nails, may be one inch less than the combined thickness of the doubling and outside planking, with longer intermediate bolts in the butts and about five feet apart, driven into the timbers of the frame.

When the doubling is two inches in thickness or above, in addition to the above fastenings, the butt bolts must be through and clenched.

The doubling in all cases is to be rabbeted into the stem, sternpost, and keel, and a strake of longitudinal doubling is to be fitted adjoining the keel, and to be one-half an inch thicker than the diagonal doubling, if the latter be two inches or less in thickness.

Should the Æ character be then assigned, the same will be continued, subject to annual survey, provided once in every four years the keel and bottom be surveyed, and the caulking tested, and the hold cleared; the windlass unhung and chain cables ranged, and the equipments and general condition of the vessel be found satisfactory. (For periodical surveys of ships classed E, *see* Section 65.)

Where modifications are desired, Shipowners may submit their proposals for the approval of the Committee through the resident Surveyor.

IRON-FASTENED SHIPS.

Section 69. All ships, although iron-fastened (except as hereinafter mentioned), shall be classed in the same manner as copper-fastened ships, so long as they remain unsheathed with copper, provided they are

in all other respects, constructed in accordance with the Rules; but, when sheathed with copper over the iron fastenings, the words "Coppered over Iron Bolts" shall be added to the Character in the Register Book, and continued until the ship be thoroughly copper-fastened.

SHIPS BUILT IN INDIA.

Section 70. Ships built in India, although fastened with iron, shall be permitted to be copper-sheathed without any mark being placed in the book, provided the bottom be felted or chunamed and wood-sheathed, and subjected to a careful examination of the iron fastenings on every occasion on which the sheathing is stripped off, for which purpose some of the bolts and nails are to be taken out of the lower part of the bottom, and to be seen by the Surveyor; but no such ship shall be permitted to continue either on the A or on the A in Red class for a longer period than one-half the number of years beyond the term originally assigned for her remaining on the A Character, unless the bottom shall have been doubled, or the whole of the iron fastenings taken out or properly secured, and the bottom refastened with bolts, or treenails, or both, including the middle line, breast-hook, and crutch bolts. (*See* Section 67.)

RUDDER, PUMPS, WINDLASS, HAWSE-PIPES, &c.

Section 71. The rudder, pumps, windlass, or capstan, scuppers, hawse-pipes, chain-plates, and side-lights to be good and efficient; and the windlass, if of wood, is in all cases to have a through square iron spindle, ranging from $2\frac{1}{2}$ to 5 inches square, according to tonnage.

The hawse-pipes must be of sufficient size and thickness, and the outside flange of proper form to admit of an easy lead for the cable to the windlass, or capstan.

EQUIPMENT.

Section 72. All vessels are required to have their masts, spars, and rigging in good order, and sails in sufficient number and in good condition.

Every ship is to be provided with anchors, cables, &c., of approved quality, properly tested at a *public machine*, in number and length, as set forth in the Table, No. 22, annexed. (*See also* Section 32.)

In cases, however, where anchors and chain cables are manufactured abroad and supplied to *foreign owned vessels*, and testing certificates are furnished setting forth that the anchors and chain cables have been tested at a Government machine, or a machine under the control of a municipal body, or a similar responsible body, such certificates will be accepted as complying with the requirements of the Rules, for obtaining the figure 1, provided the remaining requirements of Table 22 be complied with, but in these cases the record of A.&C.P. will not be made in the Register Book.

A Certificate of all Chains and Anchors having been tested, and of the strain applied to them, must be produced before the ship is classed with the Figure 1.

Section 73. The length and condition of the Chain Cables are to be ascertained by removal from the lockers on every Special Survey for Classification.

Section 74. In all cases where hempen cables are used, one-sixth more in length will be required.

ILING VESSELS.

(For Steam Vessels see other side.)

ested per Chain Cables and Anchors Acts. **Also Sizes and Lengths of Hawsers and Warps.**
tionable form and proportions.

s. *(c)* *(d)* ng Length.	Ship's Tonnage.	Numbers for Iron Vessels. *See Foot Note (a)*	Stream, Chain or Steel Wire. Chain. *(c)*		Steel Wire. Size.	Steel Wire. Breaking Test.	Towline: Hemp or Steel Wire *(e)* Hemp.		Steel Wire. Size.	Steel Wire. Breaking Test.	Hawsers and Warps. 90 fathms of each	
Fathoms.	Tons.		F'thms	Inch.	Inch.	Tons.	F'thms	Inch.	Inch.	Tons.	Inch.	Inch.
120	50	1900	45	$\frac{7}{16}$			75	5			3	—
120	75	2500	45	$\frac{8}{16}$			75	$5\frac{1}{2}$			3	—
135	100	3100	45	$\frac{8}{16}$			75	$5\frac{1}{2}$			3	—
165	125	3650	45	$\frac{8}{16}$			75	6			$3\frac{1}{2}$	—
165	150	4200	45	$\frac{9}{16}$	2	7	75	$6\frac{1}{2}$			4	—
165	175	4700	45	$\frac{9}{16}$	2	7	75	$6\frac{1}{2}$			4	—
165	200	5150	45	$\frac{10}{16}$	$2\frac{1}{4}$	$9\frac{1}{2}$	75	7			4	—
195	250	6000	45	$\frac{10}{16}$	$2\frac{1}{4}$	$9\frac{1}{2}$	75	$7\frac{1}{2}$			5	—
195	300	6800	60	$\frac{11}{16}$	$2\frac{3}{4}$	$15\frac{1}{2}$	75	8			$5\frac{1}{2}$	—
210	350	7550	60	$\frac{11}{16}$	$2\frac{3}{4}$	$15\frac{1}{2}$	75	8			$5\frac{1}{2}$	—
210	400	8250	60	$\frac{12}{16}$	$2\frac{3}{4}$	$15\frac{1}{2}$	75	$8\frac{1}{2}$			6	—
240	450	8900	60	$\frac{12}{16}$	$2\frac{3}{4}$	$15\frac{1}{2}$	75	9			$6\frac{1}{2}$	—
240	500	9600	60	$\frac{13}{16}$	3	18	75	$9\frac{1}{2}$			7	—
240	600	10800	60	$\frac{13}{16}$	3	18	90	10	$3\frac{1}{4}$	22	7	4
270	700	12000	60	$\frac{14}{16}$	$3\frac{1}{4}$	22	90	10	$3\frac{1}{4}$	22	8	5
270	800	13200	75	$\frac{14}{16}$	$3\frac{1}{4}$	22	90	10	$3\frac{1}{4}$	22	8	5
270	900	14400	75	$\frac{15}{16}$	$3\frac{1}{2}$	26	90	$10\frac{1}{2}$	$3\frac{1}{4}$	22	9	$5\frac{1}{2}$
270	1000	15500	75	$\frac{15}{16}$	$3\frac{1}{2}$	26	90	$10\frac{1}{2}$	$3\frac{1}{4}$	22	9	$5\frac{1}{2}$
270	1200	17600	75	1	$3\frac{3}{4}$	29	90	11	$3\frac{1}{2}$	26	$9\frac{1}{2}$	6
270	1400	19600	75	1	$3\frac{3}{4}$	29	90	11	$3\frac{1}{2}$	26	10	6
270	1600	21600	75	$1\frac{1}{16}$	4	33	90	11	$3\frac{1}{2}$	26	$10\frac{1}{2}$	$6\frac{1}{2}$
270	1800	23400	75	$1\frac{1}{16}$	4	33	90	12	4	33	11	7
270	2000	25100	100	$1\frac{2}{16}$	$4\frac{1}{4}$	35	90	12	4	33	11	7
300	2500	29400	120	$1\frac{2}{16}$	$4\frac{1}{4}$	35	90	13	$4\frac{1}{2}$	39	12	8
300	3000	33400	120	$1\frac{3}{16}$	$4\frac{1}{2}$	39	90	13	$4\frac{1}{2}$	39	12	8

(c) All Anchors, including Stream and Kedge Anchors, exceeding 168lbs. in weight, ex. Stock, to be tested according to the requirements of the Act of Parliament, and the Certificates of Test produced.

(c) The Chain Cables and Stream Chains to be tested in all cases according to the requirements of the Act of Parliament, and the Certificates of Test produced.

(d) Unstudded close-link Chains will be admitted as Cables, if proved to *two-thirds* the Test required for Stud-link Chains, for the *tensile* strain, and 100 per cent. above the *tensile* strain for the *breaking* strain.

(e) Where steel wire hawsers are adopted, they should, in addition to being capable of withstanding the tests given in the Table, be of ductile quality and flexible, to the satisfaction of the Surveyors.

Where a departure from the requirements of the Table for Hawsers and Warps is proposed, the same should be in all cases submitted in the first place for the approval of the Committee.

in all other respects, constructed in accordance with the Rules; but, when sheathed with copper over the iron fastenings, the words "Coppered over Iron Bolts" shall be added to the Character in the Register Book, and continued until the ship be thoroughly copper-fastened.

SHIPS BUILT IN INDIA.

Section 70. Ships built in India, although fastened with iron, shall be permitted to be copper-sheathed without any mark being placed in the book, provided the bottom be felted or chunamed and wood-sheathed, and subjected to a careful examination of the iron fastenings on every occasion on which the sheathing is stripped off, for which purpose some of the bolts and nails are to be taken out of the lower part of the bottom, and to be seen by the Surveyor; but no such ship shall be permitted to continue either on the A or on the A in Red class for a longer period than one-half the number of years beyond the term originally assigned for her remaining on the A Character, unless the bottom shall have been doubled, or the whole of the iron fastenings taken out or properly secured, and the bottom refastened with bolts, or treenails, or both, including the middle line, breast-hook, and crutch bolts. (*See* Section 67.)

RUDDER, PUMPS, WINDLASS, HAWSE-PIPES, &c.

Section 71. The rudder, pumps, windlass, or capstan, scuppers, hawse-pipes, chain-plates, and side-lights to be good and efficient; and the windlass, if of wood, is in all cases to have a through square iron spindle, ranging from $2\frac{1}{2}$ to 5 inches square, according to tonnage.

The hawse-pipes must be of sufficient size and thickness, and the outside flange of proper form to admit of an easy lead for the cable to the windlass, or capstan.

EQUIPMENT.

Section 72. All vessels are required to have their masts, spars, and rigging in good order, and sails in sufficient number and in good condition.

Every ship is to be provided with anchors, cables, &c., of approved quality, properly tested at a *public machine*, in number and length, as set forth in the Table, No. 22, annexed. (*See also* Section 32.)

In cases, however, where anchors and chain cables are manufactured abroad and supplied to *foreign owned vessels*, and testing certificates are furnished setting forth that the anchors and chain cables have been tested at a Government machine, or a machine under the control of a municipal body, or a similar responsible body, such certificates will be accepted as complying with the requirements of the Rules, for obtaining the figure 1, provided the remaining requirements of Table 22 be complied with, but in these cases the record of A.&C.P. will not be made in the Register Book.

A Certificate of all Chains and Anchors having been tested, and of the strain applied to them, must be produced before the ship is classed with the Figure 1.

Section 73. The length and condition of the Chain Cables are to be ascertained by removal from the lockers on every Special Survey for Classification.

Section 74. In all cases where hempen cables are used, one-sixth more in length will be required.

Extract from the Rules, Section 32.

TONNAGE FOR REGULATING THE SCANTLINGS & EQUIPMENT (AS REGARDS ANCHORS, CHAINS, &c.), OF WOOD & COMPOSITE VESSELS.

In flush-decked vessels having either one, two, or three decks (not being spar or awning-decked), the tonnage under the upper deck, *without abatement of the tonnage of the space for the crew, or for the propelling power of steam vessels*, is to regulate all the scantlings of the hull, and also the equipment of the vessel, as regards anchors, chains, warps, &c.

In vessels having a *raised quarter deck*, or a poop, or top-gallant forecastle, or deck houses, or awning-deck, or spar deck, the total tonnage below the tonnage deck is to regulate the scantlings of the hull, but the register tonnage, as cut on the main beam of sailing vessels and of steam vessels, *with the addition of the tonnage of the space required for propelling power*, is to regulate the equipment.

But in vessels where the tonnage of the erections above the tonnage deck is less than that allowed for crew space, *then* the *difference* between the tonnage of these erections and the tonnage of the space allowed for crew is to be *added* to the register tonnage, cut on the main beam, for the tonnage that is to regulate the equipment.

No. 304.

LLOYD'S REGISTER OF BRITISH AND FOREIGN SHIPPING.

CHAIN CABLES.

TESTING TO BREAKING STRAIN.

"Chains tested under the Chain Cable and Anchor Act of 1864, at a Machine recognised by the Committee, will be accepted for any Vessel built, commenced, or contracted for *prior* to the 1st July, 1872; and all Vessels built, commenced, or contracted for *after* the 30th June, 1872, will be required to be supplied with Chains tested in conformity with the requirements of the New Act."

By order of the Committee,
BERNARD WAYMOUTH,
Secretary.

2, White Lion Court, Cornhill, London, E.C.
1st January, 1873.

No. 22.

CHAINS AND ANCHORS FOR *SAILING* VESSELS.

(*For Steam Vessels see other side.*)

Minimum Weights of Anchors, ex. Stock; Sizes and Lengths of Chains, and the proof strain to which they are to be tested per Chain Cables and Anchors Acts. Also Sizes and Lengths of Hawsers and Warps.
The Anchors, and the links of the Chains to be of unexceptionable form and proportions.

Numbers for *Iron Vessels*, *See Foot Note* (*a*)	Ship's Tonnage.	Anchors. (*c*)											Stud-Chain Cables. (*c*) (*d*)				Ship's Tonnage.	Numbers for Iron Vessels. *See Foot Note* (*a*)	Stream, Chain or Steel Wire.				Towline: Hemp or Steel Wire (*e*)				Hawsers and Warps. 90 fathms of each	
		Number.			Weight.														Chain. (*c*)		Steel Wire.		Hemp.		Steel Wire.			
		Bowers.	Stream.	Kedges.	Bowers. (*b*) Ex. Stock.	Bowers. (*b*) Test. *	Collective Weights.	Ex. Stock. Stream.	Ex. Stock. Test. *	Ex. Stock. Kedge.	Ex. Stock. Test. *	Ex. Stock. 2nd Kdg.	Ex. Stock. Test. *	Minimum Size.	Proved to Admiralty Test.	Breaking Test.	Length.				Size.	Breakng Test.			Size.	Breakng Test.		
	Tons.				Cwts.	Tons.	Cwts.	Cwts.	Tons.	Cwts.	Tons.	Cwts.	Tons.	Inches.	Tons.	Tons.	Fathoms.	Tons.		F'thms	Inch.	Inch.	Tons.	F'thms	Inch.	Inch.	Tons.	Inch.	Inch.
1900	50	2	1	1	3½	5 1/10	7	¾	—	½	—	—	—	1 1/16	8 5/10	12 2/4	120	50	1900	45	1/16			75	5			3	—
2500	75	2	1	1	4¼	6 1/10	8½	1¼	—	½	—	—	—	1 3/16	10½	15¼	120	75	2500	45	1/16			75	5½			3	—
3100	100	2	1	1	5	7 1/10	10	1½	3 1/10	¾	—	—	—	1 3/8	11¾	17 1/10	135	100	3100	45	1/16			75	5½			3	—
3650	125	2	1	1	5¾	8	11½	1½	3 1/10	¾	—	—	—	1 7/16	13¾	20 2/4	165	125	3650	45	1/16			75	6			3½	—
4200	150	2	1	1	6½	8 1/10	13	2	4 1/10	1	—	—	—	1 1/2	15 1/10	23 1/10	165	150	4200	45	1/16	2	7	75	6½			4	—
4700	175	2	1	1	7¼	9 2/10	14½	2¼	4 1/10	1	—	—	—	1	18	27	165	175	4700	45	1/16	2	7	75	6½			4	—
5150	200	3	1	1	8¼	10 7/10	23½	2½	5	1¼	—	—	—	1 1/16	20 5/10	30 4/10	165	200	5150	45	1/16	2¼	9½	75	7			4	—
6000	250	3	1	2	10	12	28½	3¾	6 2/10	1¾	4 3/10	¾	—	1 5/16	22¾	34½	195	250	6000	45	1/16	2¼	9½	75	7½			5	—
6800	300	3	1	2	12	13 1/10	34¼	4	6 7/10	2	4 1/10	1	—	1 5/16	25⅝	38	195	300	6800	60	1/16	2¾	15½	75	8			5½	—
7550	350	3	1	2	13½	15 2/10	38½	4⅝	7 2/10	2½	5	1¼	—	1 3/8	28¼	42½	210	350	7550	60	1/16	2¾	15½	75	8			5½	—
8250	400	3	1	2	15½	16 1/10	43½	5¼	7 1/10	2½	5	1½	3 1/10	1 7/16	31	46½	210	400	8250	60	1/8	2¾	15½	75	8½			6	—
8900	450	3	1	2	16¾	18	47⅜	5½	7 1/10	2¾	5 5/10	1½	3 1/10	1 7/16	34	51	240	450	8900	60	1/8	2¾	15½	75	9			6½	—
9600	500	3	1	2	18	19	51¼	6½	8 1/10	3¼	5 1/10	1½	3 1/10	1 1/2	37½	55⅛	240	500	9600	60	1/8	3	18	75	9½			7	—
10800	600	3	1	2	21	21 1/10	60	7¼	9 2/10	3½	5 1/10	1¾	4 3/10	1 5/16	40 1/10	58 1/10	240	600	10800	60	1/8	3	18	90	10	3¼	22	7	4
12000	700	3	1	2	23½	23 1/10	67	8	10 2/10	4	6 7/10	2	4 1/10	1 5/8	43 1/10	61 4/10	270	700	12000	60	1/4	3¼	22	90	10	3¼	22	8	5
13200	800	3	1	2	25½	25 3/10	72¾	8½	10 1/10	4¼	6 1/10	2¼	4 1/10	1 11/16	47 1/10	66 4/10	270	800	13200	75	1/4	3¼	22	90	10	3¼	22	8	5
14400	900	3	1	2	27¾	26 1/10	79	8¾	10 1/10	4½	6 1/10	2¼	4 1/10	1 1/2	51¼	71⅜	270	900	14400	75	1/8	3½	26	90	10½	3¼	22	9	5½
15500	1000	3	1	2	30	28 1/10	85½	9½	11 1/10	4¾	7 3/10	2½	5	1 1/8	55⅛	77⅛	270	1000	15500	75	1/8	3½	26	90	10½	3¼	22	9	5½
17600	1200	3	1	2	32	30 3/10	91¼	10½	12 3/10	5¼	7 1/10	2½	5	1 1/8	59½	82⅝	270	1200	17600	75	1	3¾	29	90	11	3½	26	9½	6
19600	1400	3	1	2	34	31 1/10	97	10¾	12 1/10	5½	7 1/10	2½	5	1 1/4	63¼	88 1/10	270	1400	19600	75	1	3¾	29	90	11	3½	26	10	6
21600	1600	3	1	2	36½	33 2/10	104	11¼	13 2/10	5½	7 1/10	2¾	5 3/10	1 1/2	67 1/10	94 1/10	270	1600	21600	75	1 1/16	4	33	90	11	3½	26	10½	6½
23400	1800	3	1	2	38	34 1/10	108¼	11½	13 1/10	5¾	8	2¾	5 3/10	2	72	100 1/10	270	1800	23400	75	1 1/16	4	33	90	12	4	33	11	7
25100	2000	3	1	2	40	35 1/10	114	12	13 1/10	6	8 5/10	3	5 1/10	2 1/16	76 1/10	107 1/10	270	2000	25100	100	1 1/8	4¼	35	90	12	4	33	11	7
29400	2500	3	1	2	42	37 2/10	119¾	13½	15 3/10	6¾	9	3½	5 1/10	2 3/16	86¼	120 5/10	300	2500	29400	120	1 1/8	4¼	35	90	13	4½	39	12	8
33400	3000	3	1	2	45	39 2/10	128¼	15¼	16 1/10	7½	9 1/10	3¾	6 2/10	2 5/16	96¼	134¼	300	3000	33400	120	1 1/8	4½	39	90	13	4½	39	12	8

(*a*) By Section 39 of the Rules for the Building and Classification of *Iron Ships*, it is provided that "The equipment is to be regulated by the *Number* produced by the sum of the measurements of the half moulded breadth of the vessel amidships, her depth from the upper part of keel to the top of the upper-deck beams and the girth of her half midship section to the same height, multiplied by her length, for a one, two, and three-decked vessel, and for a spar-decked vessel."

For a vessel with a poop, topgallant forecastle, or a raised quarter-deck, the equipment number to be increased *one-fifteenth* beyond that which it would be if she were flush-decked.

(*b*) In order to meet the requirements of different trades, the weights of Anchors as given in the above Table may be modified as under:—

Where two Bower Anchors only are required, one of them may be 7½ per cent. lighter than the weight set forth above, provided the collective weight of the two Anchors is equal to that given in the Table.

Where three Bower Anchors are required, one of them may be 15 per cent., and another 7½ per cent. lighter than the weight set forth above, provided the collective weight of the three Anchors is equal to that given in the Table, but in no case may the best Bower Anchor be lighter than prescribed in the Table, nor the third Bower be lighter than is allowed by this footnote.

All Anchor Stocks must be of acknowledged and approved description.

* The tests of Anchors in this Table are approximate tests; or as near the Statutory tests as can be expressed in Tons and aliquot parts of tons.

(*c*) All Anchors, including Stream and Kedge Anchors, exceeding 168lbs. in weight, ex. Stock, to be tested according to the requirements of the Act of Parliament, and the Certificates of Test produced.

(*c*) The Chain Cables and Stream Chains to be tested in all cases according to the requirements of the Act of Parliament, and the Certificates of Test produced.

(*d*) Unstudded close-link Chains will be admitted as Cables, if proved to *two-thirds* the Test required for Stud-link Chains, for the *tensile* strain, and 100 per cent. above the *tensile* strain for the *breaking* strain.

(*e*) Where steel wire hawsers are adopted, they should, in addition to being capable of withstanding the tests given in the Table, be of ductile quality and flexible, to the satisfaction of the Surveyors.

Where a departure from the requirements of the Table for Hawsers and Warps is proposed, the same should be in all cases submitted in the first place for the approval of the Committee.

Lloyd's Register of Shipping, 2, *White Lion Court, Cornhill*, 14*th December*, 1882.

CHAINS AND ANCHORS FOR *STEAM* VESSELS.

(*For Sailing Vessels see other side.*)

Minimum Weights of Anchors, ex. Stock; Sizes and Lengths of Chains, and the proof strain to which they are to be tested per Chain Cables and Anchors Acts. Also sizes and lengths of Hawsers and Warps. The Anchors, and the links of the Chains to be of unexceptionable form and proportions.

Numbers for *IRON Vessels.* *See Foot Note* (*a*)	Ship's Tonnage.	Anchors. (*c*)						Stud-Chain Cables. (*c*) (*d*)				Ship's Tonnage.	Numbers for *IRON Vessels,* *See Foot Note* (*a*)	Stream, Chain or Steel Wire.				Towline: Hemp or Steel Wire (*e*)				Hawsers and Warps. 90 fathms of each	
		Number.			Weight.									Chain. (*c*)		Steel Wire.		Hemp.		Steel Wire.			
		Bowers.	Stream.	Kedges.	Bowers (*b*) Ex. Stock.	Bowers (*b*) Test. *	Collective Weights.	Ex. Stock. Stream.	Ex. Stock. Test. *	Ex. Stock. Kedge	Ex. Stock. Test. *	Ex. Stock. 2nd Kdg.	Ex. Stock. Test. *	Minimum Size.	Proved to Admiralty Test.	Breaking Test.	Length.			Size.	Breakng Test.			Size.	Breakng Test.		
	Tons.				Cwts.	Tons.	Cwts.	Cwts.	Tons.	Cwts.	Tons.	Cwts.	Tons.	Inch.	Tons.	Tons.	Fathoms.	Tons.		F'thms	Inch.	Inch.	Tons.	F'thms	Inch.	Inch.	Inch.	Inch.
2750	75	2	1	1	3½	5 1/2 8/0	7	¾	—	½	—	—	—	1 1/16	8 1/5 6/0	12 3/4	120	75	2750	45	1 5/16	—	—	75	5½			3	—
3750	112	2	1	1	4¼	6 1/2 8/0	8½	1¼	—	½	—	—	—	1 1/8	10 1/8	15 1/8	120	112	3750	45	1 9/16	2	7	75	6			4	—
4630	150	2	1	1	5	7 3/0 7/0	10	1½	3 1/2 8/0	¾	—	—	—	1 3/16	11 1/4	17 1/16 8/0	135	150	4630	45	1 9/16	2	7	75	6			4	—
5420	188	2	1	1	5¾	8	11½	1½	3 1/2 8/0	¾	—	—	—	1 1/4	13 3/4	20 5/8	165	188	5420	45	1 5/8	2¼	9½	75	6½			4	—
6150	225	2	1	1	6½	8 1/2 8/0	13	2	4 1/2 0/0	1	—	—	—	1 5/16	15 1/8 8/0	23 7/10	165	225	6150	45	1 5/8	2¼	9½	75	7			5	—
6840	262	2	1	1	7½	9 3/8 0/0	14½	2¼	4 1/2 8/0	1	—	—	—	1	18	27	165	262	6840	45	1 1/2	2¾	15½	75	7½			5½	—
7490	300	3	1	1	8½	10 1/4 7/0	23½	2½	5	1¼	—	—	—	1 1/16	20 1/8 0/0	30 1/8 0/0	165	300	7490	60	1 1/8	2¾	15½	75	7½			5½	—
8670	375	3	1	2	10	12	28½	3¾	6 3/8 0/0	1¾	4 1/4 0/0	¾	—	1 1/16	22 3/4	34 1/2	195	375	8670	60	1 1/8	2¾	15½	75	8			6	—
9770	450	3	1	2	12	13 1/2 0/0	34¼	4	6 3/7 0/0	2	4 1/2 0/0	1	—	1 1/8	25 3/8	38	195	450	9770	60	1 1/8	3	18	75	8½			6½	—
10790	525	3	1	2	13½	15 3/8 0/0	38½	4¾	7 3/8 0/0	2½	5	1¼	—	1 3/16	28 1/8	42 1/2	210	525	10790	60	1 3/8	3	18	75	8½			6½	4
11740	600	3	1	2	15½	16 1/4 8/0	43½	5¼	7 1/2 0/0	2½	5	1½	3 1/2 0/0	1 1/4	31	46 1/2	210	600	11740	60	1 1/4	3¼	22	90	9			7	5
12620	675	3	1	2	16¾	18	47¾	5½	7 1/2 8/0	2¾	5 3/5 0/0	1½	3 1/2 0/0	1 5/16	34	51	240	675	12620	60	1 5/16	3¼	22	90	9			7	5
13450	750	3	1	2	18	19	51½	6½	8 1/2 8/0	3¼	5 1/2 8/0	1½	3 1/2 0/0	1 7/16	37 1/4	55 5/8	240	750	13450	60	1 5/16	3½	26	90	9½			7½	5½
15120	900	3	1	2	21	21 1/2 8/0	60	7½	9 3/8 0/0	3½	5 1/2 8/0	1¾	4 1/4 0/0	1 1/8	40 1/5 6/0	58 7/10	240	900	15120	75	1 5/16	3½	26	90	10	3¼	22	8	5½
16720	1050	3	1	2	23½	23 1/2 8/0	67	8	10 3/8 0/0	4	6 3/7 0/0	2	4½	1 1/16	43 1/8 0/0	61 1/4 6/0	270	1050	16720	75	1	3¾	29	90	10	3¼	22	8	6
18260	1200	3	1	2	25½	25 3/8 0/0	72¾	8½	10 1/2 8/0	4½	6 1/2 8/0	2¼	4 1/2 0/0	1 1/16	47 1/5 0/0	66 1/5 6/0	270	1200	18260	75	1	3¾	29	90	10	3¼	22	8½	6
19780	1350	3	1	2	27¾	26 1/2 8/0	79	8¾	10 1/2 7/0	4½	6 1/2 7/0	2¼	4 1/2 0/0	1 1/8	51¼	71¾	270	1350	19780	75	1 1/16	4	33	90	11	3½	26	9	7
21280	1500	3	1	2	30	28 1/2 8/0	85½	9½	11 1/2 0/0	4¾	7 3/8 0/0	2½	5	1 1/8	55½	77 1/8	270	1500	21280	75	1 1/16	4	33	90	11	3½	26	9	7½
24220	1800	3	1	2	32	30 3/8 0/0	91¼	10½	12 3/8 0/0	5¼	7 1/2 0/0	2½	5	1 1/8	59½	82 3/8	270	1800	24220	75	1 3/16	4¼	35	90	12	4	33	9½	7½
27140	2100	3	1	2	34	31 1/2 8/0	97	10¾	12 1/2 8/0	5½	7 1/2 8/0	2½	5	1 1/4	63½	88 1/8 0/0	270	2100	27140	75	1 3/16	4¼	35	100	12	4	33	9½	8
30020	2400	3	1	2	36½	33 3/8 0/0	104	11¼	13 3/8 0/0	5½	7 1/2 8/0	2¾	5 1/2 0/0	1 1/16	67 1/8 0/0	94 1/8 0/0	300	2400	30020	90	1 3/16	4½	35	100	12	4	33	10	8½
32820	2700	3	1	2	38	34 1/2 0/0	108¼	11½	13 3/7 0/0	5¾	8	2¾	5 1/2 0/0	2	72	100 1/8 0/0	300	2700	32820	90	1 3/16	4½	39	120	12	4	33	10	8½
35450	3000	3	1	2	40	35 1/2 8/0	114	12	13 1/2 7/0	6	8 3/8 0/0	3	5 1/2 0/0	2 1/16	76 1/8 0/0	107 1/10 0/0	300	3000	35450	90	1 3/16	4½	39	120	13	4½	39	10	9
39600	3500	4	1	2	41½	36 1/2 8/0	159¾	12¾	14 1/2 0/0	6½	8 1/2 8/0	3¼	5 1/2 8/0	2 1/8	81¼	113¾	300	3500	39600	90	1 3/16	4½	39	120	13	4½	39	11	9
43600	4000	4	1	2	43	37 1/2 7/0	165½	14	15 1/2 8/0	7	9 3/8 0/0	3½	5 1/2 8/0	2 3/16	86¼	120 1/8 0/0	300	4000	43600	90	1 1/4 6/0	4¾	47	120	14	4¾	47	12	10
47400	4500	4	1	2	45	39 3/8 0/0	173¼	15¼	16 1/4 8/0	7½	9 1/2 8/0	3½	5 1/2 8/0	2 1/4 6/0	91⅛	127 1/8 0/0	300	4500	47400	90	1 1/4 6/0	4¾	47	120	14	4¾	47	12	10
51000	5000	4	1	2	46½	40 3/3 0/0	179	16¾	18	8½	10 1/2 8/0	4	6 1/2 0/0	2 5/16	96¼	134 3/4	300	5000	51000	90	1 5/16	5	59	120	15	5	59	12	10
55000	5500	4	1	2	49	41 1/2 5/0	188	19	19 1/2 7/0	9½	11 1/2 1/0	4½	6 1/2 7/0	2 6/16	101½	142 1/10 0/0	330	5500	55000	120	1 1/16 5/6	5	59	130	15	5	59	13	11
59000	6000	4	1	2	52	43 1/2 3/0	198	22	22 1/2 7/0	10½	12 3/8 0/0	5¼	7 1/2 8/0	2 7/16	107	149 1/10 0/0	330	6000	59000	120	1 1/16 5/6	5	59	130	15	5	59	13	11
63000 TO 70000	6500 TO 7000	4	1	2	55	45 1/2 7/0	210	25	24 1/2 8/0	12	13 1/2 7/0	6	8 3/8 0/0	2 8/16	112½	157 1/10 0/0	330	6500 TO 7000	63000 TO 70000	120	1 1/16 6/6	5¼	71	130	16	5¼	71	13	11

The following Machines are recognised by the Committee of Lloyd's Register for the purpose of testing Anchors and Chains while licensed by the Board of Trade for that purpose:—

LONDON—Trinity Proving House ..... Superintendent, Mr. L. R. Isitt.
(*Closed May*, 1875).

TIPTON—Lloyd's Proving House..... ditto Mr. E. R. Isitt.

Assistant ditto Mr. W. Turton.

NETHERTON—Lloyd's Proving House..... ditto Mr. D. G. Lewis.

Assistant ditto Mr. E. Seedhouse

LOW WALKER—Lloyd's Proving House .... ditto Mr. R. Burrell.

Assistant ditto Mr. J. Tron.

CHESTER (Saltney)—Lloyd's Proving House. ditto Mr. A. S. Jack.

Assistant ditto Mr. J. Littler.

GLASGOW—Lloyd's Proving House ..... ditto Mr. W. Fraser

CARDIFF—Lloyd's Proving House ..... ditto Mr. G. W. Penn.

SUNDERLAND—River Wear Commission,
Public Test ditto Mr. J. Hartness.

And any other Machine will be recognised by the Committee which is or may be hereafter duly licensed by the Board of Trade for the purpose of testing Anchors and Chains.

(*a*) By Section 39 of the Rules for the Building and Classification of *Iron Ships*, it is provided that "The equipment is to be regulated by the *Number* produced by the sum of the measurements of the half moulded breadth of the vessel amidships, her height, multiplied by her length, for a one, two, and three-decked vessel, and for a spar-decked vessel, awning-decked vessel, or a vessel having a continuous shade deck."

For a vessel with a partial awning-deck, poop, topgallant forecastle, *enclosed* bridge-house, or a raised quarter-deck, the equipment number to be increased *one-fifteenth* beyond that which it would be if she were flush-decked, when the united lengths of such erections does not exceed one-fourth the length of the vessel, and when this proportion of the length is exceeded, the equipment number to be increased *one-tenth* beyond that which it would be if she were flush-decked.

Lloyd's Register of Shipping, 2, White Lion Court, Cornhill, 14th December, 1882.

(*b*) In order to meet the requirements of different trades, the weights of Anchors as given in the above Table may be modified as under:—

Where two Bower Anchors only are required, one of them may be 7½ per cent. lighter than the weight set forth above, provided the collective weight of the two Anchors is equal to that given in the Table.

Where three Bower Anchors are required, one of them may be 15 per cent., and another 7½ per cent. lighter than the weight set forth above, provided the collective weight of the three Anchors is equal to that given in Table, but in no case may the best Bower be lighter than prescribed in Table, nor the third Bower be lighter than is allowed by this footnote.

Where four Bower Anchors are required, one may be 15 per cent., and another 7½ per cent. lighter than the weight set forth above, provided the collective weight of the four Anchors is equal to that given in the Table, but two at least of the Bower Anchors must not be lighter than required by the Table. All Anchor Stocks must be of acknowledged and approved description.

* The tests of Anchors in this Table are approximate tests; or as near the Statutory tests as can be expressed in tons and aliquot parts of tons.

(*c*) All Anchors, including Stream and Kedge Anchors, exceeding 168lbs. in weight, ex. Stock, to be Tested according to the requirements of the Act of Parliament, and the Certificates of Test produced.

(*c*) The Chain Cables and Stream Chains to be tested in all cases according to the requirements of the Act of Parliament, and the Certificates of Test produced.

(*d*) Unstudded close-link Chains will be admitted as Cables, if proved to *two-thirds* the Test required for Stud-link Chains, for the *tensile* strain, and 100 per cent. above the *tensile* strain for the breaking strain.

(*e*) Where steel wire hawsers are adopted, they should, in addition to being capable of withstanding the tests given in the Table, be of ductile quality and flexible, to the satisfaction of the Surveyors.

Where a departure from the requirements of the Table for Hawsers and Warps is proposed, the same should be in all cases submitted in the first place for the approval of the Committee.

Section 75. **BOATS**:—All vessels under 150 tons to be provided with one good Boat; and every vessel of 150 tons and above to have a suitable number. The Surveyors are to be particular in examining and reporting the condition of the boats of *all* vessels.

Section 76. The efficient state and condition of the whole of the ship's equipment will be designated by the Figure 1; and where the same is found insufficient in quantity, or defective in quality, by a dash, thus — following the character assigned to the ship.

DEFECTIVE EQUIPMENT.

In the case of a steam-vessel already classed, of which the engines or boilers are reported to be so far inefficient or defective as to imperil the vessel's safety, an indication to that effect will be made in the Register Book by a red ring being stamped, or posted over the figure 1 for equipment, and in the case of vessels about to be built, for which drawings are submitted for the approval of the Committee, and where the engines or boilers are of novel description, or where experience has not sufficiently shown the safety of the principle or mode of application involved, the figure 1 will not be assigned, and the words —"Boiler Experimental," or "Machinery Experimental," will be placed against the class of the vessel, in the Register Book; but, where in the opinion of the Committee the Machinery or Boilers are deemed so far inefficient or defective as to imperil the vessel's safety, the figure 1 will be withheld, and a red ring inserted in place thereof; and, in the case of masts or rigging of a ship which are reported to be so far defective as to imperil the vessel's safety, the indication in the Register Book will be made by a black ring, stamped or posted over the figure 1 for equipment; as described in the foot-note on the page of the Register Book and in the Key thereto; and it is to be understood that, although, for facilities in contracting, a class, to which the hull of a vessel may be found entitled, will be assigned, the class will not be inserted in the Register Book unless the engines and boilers have been surveyed in accordance with the requirements of the Rules. (*See also* Sections 78 and 81 for Steam Ships.)

SHIPS NAVIGATED BY STEAM.

Section 77. Steam ships are to be subject to the same periodical surveys as sailing vessels, and whenever the boilers are taken out the vessel is to be submitted to a particular and special survey, in order to ascertain her general condition. (*See also* Sections 78 and 81.)

MACHINERY AND BOILERS OF STEAM SHIPS.

Section 78. In new vessels propelled by steam, and in vessels fitted with new engines or boilers, the machinery is to be submitted to the inspection of the Society's Engineer-Surveyors, who will furnish a report to the Committee describing them, in the manner and form, No. 8, annexed. The Committee will thereupon, if found satisfactory, grant a certificate, and insert in the Register Book the notification "L.MC." *in red* (*i.e.* LLOYD'S MACHINERY CERTIFICATE) indicating that the machinery and boilers are certified to be in good order and safe working condition. (*See* Sections 76 and 81.)

If the machinery or boilers are specially surveyed during their construction, a distinguishing mark ✠ in red is added, thus: "✠ L.MC.", or ✠ N.E.&B. 82, or ✠ N.B. 82.

In order to facilitate this inspection, the plans of the machinery and boilers should be examined, and from them the working pressure fixed.

In cases where it is proposed to construct boilers of steel for classed vessels, or vessels intended for classification, the material is required to fulfil the following conditions (*See* Circular No. 438*, page 122):—

1. The material is to have an ultimate tensile strength of not less than 26 and not more than 30 tons per square inch of section,* with an ultimate elongation of not less than 20 per cent. in a length of eight inches. It is to be capable of being bent to a curve of which the inner radius is not greater than one and a half times the thickness of the plates or bars, after having been heated uniformly to a low cherry-red and quenched in water of 82 degrees Fahrenheit.
2. Steel rivets are to be considered as part of the material, and, in addition to being subjected to a shearing test, they must be capable of withstanding the same tests as the plates are required to undergo.
3. Samples for testing are to be selected from each batch of plates submitted for approval, care being taken in the selection that, as far as possible, each cast or furnace charge from which the material has been produced is represented. In addition to these tests, the temper test is to be applied to samples taken from *every* plate intended to be used in the furnaces and combustion chambers of the boilers.
4. All the holes in steel boilers should be drilled; but, if they be punched, the plates are to be afterwards annealed.
5. All plates that are dished or flanged, or in any way heated in the fire for working, except those that are subjected to a compressive stress only, are to be annealed after the operations are completed.
6. No steel stays are to be welded.
7. Unless otherwise specified, the Rules for the construction of iron boilers will apply equally to boilers made of steel.

The Surveyors will be guided in fixing the working pressure by the tables and formulæ annexed.

Any novelty in the construction of the machinery or boilers to be reported to the Committee.

The boilers, together with the machinery, to be inspected at different stages of construction.

The boilers to be tested by hydraulic pressure, in the presence of the Engineer-Surveyor, to twice the working pressure, and carefully gauged while under test.

Two safety valves to be fitted to each boiler and loaded to the working pressure in the presence of the Surveyor. If common valves are used, their combined areas to be at least half a square inch to each square foot of grate surface. If improved valves are used, they are to be tested under steam in the presence of the Surveyor; the accumulation in no case to exceed 10 per cent. of the working pressure.

An approved safety valve also to be fitted to the superheater.

In winch boilers one safety valve will be allowed, provided its area be not less than half a square inch per square foot of grate surface.

* Steel of a less tensile strength than 26 tons per square inch, if satisfactory in other respects, may be allowed in any case where the scantlings are equal to those prescribed in the Rules for Iron Boilers. In such cases the Surveyors should represent the facts for the Committee's consideration.

Each valve to be arranged so that no extra load can be added when steam is up, and to be fitted with easing gear which must lift the valve itself. All safety-valve spindles to extend through the covers and be fitted with sockets and cross handles, allowing them to be lifted and turned round in their seats, and their efficiency tested at any time.

Stop valves to be fitted so that each boiler can be worked separately.

Each boiler to be fitted with a separate steam-gauge, to accurately indicate the pressure.

Each boiler to be fitted with a blow-off cock independent of that communicating with the sea.

The machinery and boilers are to be securely fixed to the vessel to the satisfaction of the Surveyors.

Gauges of an approved description for testing the truth of the crank shafts are to be supplied with all new engines, and adjusted in the presence of the Surveyor.

The engines are to be fitted with two feed pumps each capable of supplying the boilers; the pumps, &c., to be so arranged that either can be overhauled whilst the other is at work.

The engines are to be fitted with two bilge pumps, which are to be so arranged that either can be overhauled whilst the other is at work.

In engines of 70 H.P. and under, one feed pump and one bilge pump will be deemed sufficient, provided they are of adequate capacity.

A bilge injection or a bilge suction to the circulating pump is to be fitted.

Engine bilge pumps are to be so fitted as to pump from each compartment of the vessel. The roses in engine room and mud boxes to be placed in positions where they are easily accessible, and to be to the satisfaction of the Surveyors.

A donkey pump is to be provided capable of supplying the boilers with water. A donkey is to be so fitted as to pump from each compartment, to deliver water on deck, and, if no hand pump is fitted in engine-room, it must be fitted to be worked by hand.

All steam and feed pipes are to be of copper, of a thickness to the satisfaction of the Surveyors.

All discharge pipes to be, if possible, carried above the deep load-line, and to have discharge-valves fitted *in an accessible position.*

No pipes to be carried through the bunkers without being properly protected.

Bilge suction pipes to be arranged to pump direct from each compartment, the roses to be fixed in places where they can be easily accessible.

COCKS, PIPES, AND SEA CONNECTIONS.

With a view to ensuring better control over cocks, valves, and pipes connecting the engines and boilers with the sea, they are to be fixed as follows in all new vessels and in vessels having new engines or boilers.

All sea-cocks to be attached to Kingston valves of a height sufficient to lift them up to the level of platforms.

Cocks and valves connecting all suction pipes to be fixed above the stoke-hold and engine-room platforms.

The arrangement of pumps, bilge injections, suction and delivery pipes, to be such as will not permit of water being run from the sea into the vessel by an act of carelessness or neglect. Any defective arrangement to be reported to the Committee.

SPARE GEAR.

The articles of Spare Gear mentioned in the following list will be required to be carried in all steam vessels classed in the Society's Register Book, viz.:—

2 connecting rod top-end bolts and nuts
2 connecting rod bottom-end bolts and nuts
2 main-bearing bolts
1 set of coupling bolts
1 set of feed and bilge pump valves
1 set of piston springs (where common springs are used)
A quantity of assorted bolts and nuts
Iron of various sizes.

In addition to the foregoing, the following articles are recommended to be carried with a view to expedite repairs and lessen delay in distant ports, viz.:—

Crank shaft
Propeller shaft
Propeller, or a full set of blades
Stern bush, or lignum-vitæ lining for bush
Air pump rod
Circulating pump rod
H.P. valve spindle
L.P. valve spindle
1 set of check valves
1 pair of connecting rod brasses
1 pair of cross-head brasses
1 set of link brasses
1 cylinder escape valve and spring
1 eccentric strip complete
6 junk ring bolts
6 cylinder cover bolts
4 valve chest cover bolts
2 dozen boiler tubes
3 dozen condenser tubes
1 set of safety valve springs.

PERIODICAL INSPECTION OF MACHINERY. (*See* N.B. at foot.)

The machinery and boilers of all steam ships are to be surveyed annually, if practicable, and in addition to be submitted to a Special Survey every four years, and the boilers to Special Survey when six years old, and subsequently to annual Survey.

At these Special Surveys the propeller, stern-bush, and fastenings of the sea connections are to be examined while the vessel is in dry dock, and, if deemed necessary by the Surveyor, the stern shaft is to be drawn and examined.

The cylinders, pistons, slide valves, crank shaft, and pumps are to be examined, and if necessary the condenser is to be examined and tested.

The boilers and superheaters are to be examined, and if deemed necessary by the Surveyors are to be drilled or tested by hydraulic pressure; the safe working pressure is to be determined by their actual condition.

The safety valves are to be examined and set to the safe working pressure.

The sea connection and arrangements of cocks, pipes, bilge suctions, roses, &c., are to be examined.

If satisfactory, these surveys will be recorded in the Register Book thus: "L.M.C. 5,82" in red; "B.&M.S. 5,82" in red.

N.B.—In reference to the Rules above quoted, and in order to prevent the disappointment arising from ships losing their Characters from want of survey, it is hereby intimated that the duty of giving NOTICE OF PERIODICAL SURVEYS *required by the Rules, or when repairs are necessary in consequence of damage, or from other causes, rests with the Owners, Masters, or Agents.*

"L.MC." (LLOYD'S MACHINERY CERTIFICATE) with a date, denotes that the machinery and boilers are fitted in accordance with the Rules, and were found upon examination at that time to be in good condition.

"B.&M.S." (BOILERS AND MACHINERY SURVEYED) with a date, denotes that the boilers and machinery though not fitted strictly in accordance with the Rules, were found upon inspection at that time to be in good condition.

"B.S." (BOILERS SURVEYED) with a date, denotes that the boilers were found upon inspection at that time to be in good condition.

In the event of either the machinery or boilers appearing to be impaired to such an extent as renders it desirable that either or both be specially surveyed within the periods prescribed above, a Certificate for either machinery or boilers for a limited period will be granted according to the nature of the case.

Section 79. HULL:—The Surveyors are directed to examine and report the scantling of timbers, plank, and fastenings, and to state where built, and by whom, in the same manner as directed for sailing vessels.

Section 80. The Surveyors are required to report the number, size, length, fastenings, and mode of arrangement of the engine and boiler *sleepers*, and the description of timber of which they are composed, and whether diagonally trussed with wood or iron, and to what extent; the length, size, and fastenings of shelf-pieces and paddle-beams; and whether the vessel be constructed with sponsons and how they are formed; and to give the length and shifting of the plank outside and inside.

EQUIPMENT.

Section 81. The Surveyors are to examine and report the number and description of the masts, spars, sails, anchors, cables, hawsers, warps, and boats, as directed to be done for sailing vessels. For weight of anchors, size and length of chains, *see* Table No. 22 and Section 32, *also* Sections 72 to 76.

The boilers and machinery are to be considered as part of the equipment, and, unless the Surveyors are satisfied of their efficiency, the figure 1 will be withheld, and it is to be understood that, although, for facilities in contracting, a class, to which the hull of a vessel may be found entitled, will be assigned, the class will not be inserted in the Register Book unless the engines and boilers have been surveyed in accordance with the requirements of the Rules. (*See also* Sections 76 to 78.)

Section 82. BOATS:—The Surveyors are to be particular in examining and reporting the condition of the boats of all vessels.

FOREIGN BUILT SHIPS CLASSED WITH THE CHARACTER F.*

Section 83. Foreign built Ships *which have not been constructed in accordance with the Rules*, and have not been surveyed by the Surveyors to this Society while building, for which the Owners have heretofore desired the character F, have been surveyed as follows:—

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* Mem. 1st July, 1876:—*The Character* **F** *will not in future be assigned in the first Classification of Ships. Those Ships, however, which have already been assigned this Character will be allowed to retain the same upon Periodical Survey in accordance with the requirements of Section* 83 *of the Rules. Owners of Ships so classed are, at the same time, invited to submit their Vessels for Classification with some other Character provided for in the Rules.*

SURVEY No. 1.

In the case of a ship classed F of less than four years old, she was on such survey either placed in dry dock or laid upon blocks upon ways, so that the keel and bottom were seen and properly examined.

The hold cleared, and proper stages made both inside and outside.

All air-courses and the limbers cleared.

Bolts and treenails driven out at different parts of the ship, and in sufficient numbers to enable the Surveyors to ascertain their condition; the condition of the plank and timbers in the treenail holes also ascertained.

A listing of not less than four inches wide, and equal to one-fifth of the length of the ship on each side cut out below each set of clamps or shelves in such parts as the Surveyors may have required, sufficient to enable them to ascertain the size and condition of the frame.

The condition of the oakum and caulking ascertained.

The windlass unhung, and its wood lining sufficiently stripped for examination.

The cables and general equipment attended to as prescribed in Sections 72 to 76, and in Table 22.

The Surveyors then examined and reported upon the ship, as to the state of the timbers of the frame (where examined), planking inside and outside, decks, waterways, beams, knees, keel, keelsons, stem, apron, hawse-timbers, knight-heads, breast-hooks, transoms, rudder, and windlass, the sheer and general form of the ship, particulars of materials and scantlings, so far as they were ascertained, and spacing of timbers and beams, thickness and shifting of plank, mode of fastening, and the sizes and condition of the bolts and treenails.

SURVEY No. 2.

In the case of a ship classed F of four or more years old when surveyed, in addition to the foregoing Survey, she was scraped bright from the light water-mark upwards, including the plankshеers and waterways; the beam-ends examined by boring and sounding, and a listing of not less than four inches wide cut fore and aft below each set of clamps or shelves, and at the bilges at the discretion of the Surveyor, and a short listing outside at each buttock.

This Survey applicable to all ships of four or more years old when surveyed, whether they have had the short listings previously cut or not.

If after such examination all repairs have been done to the satisfaction of the Surveyors, so as to enable them to make a favourable Report, a class of efficiency has been granted by the Committee, and entered in the Register Book, which class will be retained for a period not exceeding four years, subject to annual Surveys,—unless it shall be made to appear by the Owner that the ship has not been in any port during that period, where the Society has a Surveyor.

These Surveys are noted in the Register Book, thus (S.S.No.1–75–4yrs.), (S.S.No.2–75–4yrs.), indicating the special survey and date thereof.

There are two designations of condition or character, distinguished thus :—

1 F

2 F

1 F denotes ships which have been found on survey to be of a superior description, fit for the conveyance of dry and perishable goods to and from all parts of the world.

2 F denotes ships which, although not equal to the foregoing, have nevertheless been found on survey to be in a good and efficient condition, and fit for the conveyance of dry and perishable goods, on shorter voyages.

It is to be distinctly understood that the foregoing regulations are confined in their application to *Foreign Built Ships*.

These classes can, in the case of vessels already classed F, be repeatedly continued for a period of four years, by the ship being subjected to the requirements of Survey No. 2, and the annual Surveys.

Owners of Ships so classed are, at the same time, invited to submit their Vessels for Classification with some other Character provided for in the Rules.

To entitle the ships to Fig. 1, they must be supplied with stores in accordance with Table 22, attached to the Rules, and the general equipment attended to as prescribed in Sections 72 to 76.

LLOYD'S REGISTER OF BRITISH AND FOREIGN SHIPPING,

London, 1*st July*, 1883.

THE SAME TO BE OF GOOD QUALITY, PROPERLY SEASONED, AND FREE FROM DEFECTS.

	OUTSIDE PLANK, &c.				INSIDE PLANK, &c.		
	From op of Keel to o-fifths the th of Hold.	From two-fifths the depth of Hold to Wales.	Wales, Black-Strakes, Topsides, and Sheer-Strakes.	Upper deck Waterway, Spirk'ting, and Planksh'rs.	Shelves, Clamps, Limber and Bilge Strakes, Ceiling in Hold and betwixt Decks, also Spirketting and Waterway below the Upper Deck.		
1	16	16	16	16	16	East-India Teak	1
2	12	12	12	12	12	English, African, & Live Oak, Adriatic, Italian, Spanish, Portuguese, and French Oak; Morung Saul, Greenheart, Morra, Iron Bark, and White Iron Bark	2
3	12	10	10	10	12	Cuba Sabicu, Pencil Cedar, Angelly, Venatica, Jarrah Timber, Karri, Blue Gum, Red Gum, Box, Thingam, and Puhutukawa.....	3
4	—	—	—	7	7	Second-hand English, African, and Live Oak, Adriatic, Italian, Spanish, Portuguese, and French Oak; East-India Teak, Morung Saul, Greenheart, Morra, and Iron Bark *(e)*	4
5	12	8	7	7	8	Stringy Bark, and Red Cedar	5
6	*12	10	10	10	*10	Danish Oak, other Continental White Oak, Mahogany of *Hard Texture*, Spanish Chestnut, Flooded Gum, Spotted Gum, Grey Gum, Turpentine, Black Butt, Tulip-wood, Tallow-wood, & Mulberry.	6
7	*12	*8	8	8	8	North American *White* Oak	7
8	*12	10	10	*10	10	Pitch Pine, Oregon Pine, Huon Pine, Cowdie or Kaurie Pine, Larch, Hackmatack, Tamarac, & Juniper.	8
9	*9	9	9	*10	9	Dantzic, Memel, Riga, and American Red Pine	9
10	*10	5	—	—	—	English Ash	10
11	*8	6	—	—	*5	Foreign Ash and Rock Maple	11
12	*12	7	6	6	7 *(b)*	American Rock Elm and Hickory	12
13	*12	6	—	—	—	European and American Grey Elm	13
14	*10	6	6	—	—	Black Birch and Black Walnut	14
15	*8	8	8	8	8	Spruce Fir, Swedish and Norway Red Pine, and Scotch Fir	15
16	*12	6	—	—	—	Beech	16
17	*6	*5	*5	*5 *(c)*	*5	Yellow Pine	17

line No. 4 is proposed to be
of a special survey to be held
and of adequate size, a higher
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Sh
rs amidships to an extent not
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of tent in Ships of the 8 years'

300 of the United Kingdom.

☞ **SALTING.** *All* Ships built of the Timber above named, except those built wholly of Teak, will have one year added to their classification, if salted, provided it be done to the satisfaction of the Surveyors and as prescribed in Section 37 of the Rules; but Vessels built of the Materials contained in Lines 6 to 17 inclusive *must* be salted, or one year will be deducted from the term of years assigned on the Table, except where used for those parts indicated by an asterisk, thus: *

TABLE B.

MINIMUM DIMENSIONS OF TIMBERS, KEELSON, KEEL, PLANKING, &c.

TONNAGE ..... TONS....	50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1050	1150	1250	1350	1500	1750	2000
(a) TIMBER AND SPACE ..... INCHES..	18	19	20	21½	23	24¼	25¾	27¼	28½	30	30¼	30½	31	31¼	31½	31¾	32¼	32½	32¾	33¼	33½	33½	33¾	34	34½	35
Floors, sided and moulded at Keelson, if squared	7	7½	8	8¾	9½	10¼	11	11¾	12¼	13	13¼	13¼	13½	13½	13¾	13¾	14	14	14¼	14½	14¾	15	15¼	15¼	15½	15¾
Double Floors, sided and moulded at Keelson, if squared	6	6½	7	7¾	8½	9¼	10	10½	11¼	12	12¼	12¼	12½	12½	12¾	12¾	13	13	13¼	13½	13¾	14	14¼	14¼	14½	14¾
(b) 1st Futtocks, sided and moulded at Floor Heads, if squared	6	6½	7	7¾	8¼	8¾	9¼	10	10½	11	11¼	11½	11¾	11¾	12	12¼	12¼	12½	12¾	13¼	13½	13¾	14¼	14¼	14½	14¾
2nd Futtocks, sided, if squared	5½	6	6½	7	7½	8	8½	9	9½	10	10¼	10½	10¾	10¾	11	11¼	11¼	11½	11¾	12¼	12½	12¾	13¼	13¼	13½	13¾
3rd Futtocks and Long Top Timbers, sided, if squared.....	5½	5¾	6	6½	7	7¼	7¾	8¼	8½	9	9¼	9½	9¾	9¾	10	10¼	10¼	10½	10¾	11¼	11½	11¾	12¼	12¼	12½	12¾
Top Timbers (Short) sided, if squared	..	..	..	..	..	..	..	..	..	9	9¼	9¼	9¼	9½	9½	9½	9¾	9¾	10	10	10¼	10½	10¾	10¾	11	11¼
Top Timbers, moulded at heads, if squared	4	4½	4¾	5	5	5¼	5½	5¾	6	6	6¼	6¼	6¼	6½	6¾	6¾	7	7	7¼	7¼	7½	7¾	8½	8½	8¾	9
Breasthooks & Wing Transom, sided & moulded in the middle	8	8½	9	9¾	10¼	10¾	11¼	12	12½	13	13¼	13¼	13½	13½	13¾	13¾	14	14	14¼	14½	14¾	15	15¼	15¼	15½	16
(c) Keel, Stem, Apron, and Sternpost, sided and moulded	8	9	10	10¾	11¼	11¾	12¼	13	13½	14	14¼	14¼	14½	14½	14¾	14¾	15	15	15¼	15½	15¾	16	16¼	16½	16¾	17
Keelson, also the Mainpiece of Rudder from lower part of Counter upwards, sided and moulded	9	10	11	11¾	12¼	12¾	13¼	14	14½	15	15¼	15¼	15½	15½	15¾	15¾	16	16	16¼	16½	16¾	17	17¼	17½	17¾	18
(d) Wales	3	3½	4	4½	4¼	4½	4¾	4¾	5	5	5	5	5¼	5¼	5¼	5½	5½	5½	5¾	6	6	6	6¼	6¼	6¾	7
(e) Bottom Plank, from Keel to Wales.....	2	2¼	2½	2¾	3	3¼	3½	3¾	3¾	4	4	4	4	4	4	4¼	4¼	4¼	4¼	4½	4½	4½	4½	4¾	5	
Sheer Strakes, Topsides, Upper Deck Clamp where there is no Shelf fitted, and Lower Deck Clamp with a Shelf	2¼	2½	3	3¼	3½	3½	3¾	3¾	4	4	4	4	4	4¼	4¼	4¼	4¼	4¼	4½	4½	4¾	4¾	5	5¼	5½	5½
Ceiling below Hold Beam Clamp	1½	1¾	2	2¼	2½	2¾	2¾	2¾	3	3	3	3¼	3¼	3¼	3¼	3½	3½	3½	3½	3¾	3¾	4	4	4¼	4½	4½
(f) Waterway, { Hardwood	3½	4	4½	5	5	5½	5½	6	6	6½	6½	6½	7	7	7	7	7½	7½	7½	7½	7½	8	8	8½	9	
Fir	4	4½	5	5½	6	6½	6½	7	7½	8	8	8	8½	8½	8½	8½	9	9	9	9	9	9½	9½	9½	9½	10
Ceiling betwixt Decks	1½	1¾	2	2	2¼	2¼	2¼	2½	2½	2½	2½	2½	2½	2¾	2¾	2¾	2¾	2¾	2¾	2¾	3	3	3	3¼	3½	3½
Bilge Plank, inside, Thick Strakes over long and short Floorheads, and Limber Strake	2½	3	3½	3¾	3¾	4	4¼	4¼	4½	4½	4½	4½	4½	4½	4¾	4¾	5	5	5¼	5½	5¾	6	6¼	6½	7	
Lower Deck Clamp where there is no shelf fitted, and Spirketting	..	..	3	3¼	3½	3¾	4	4	4¼	4½	4½	4¾	4¾	4¾	4¾	4¾	5	5	5	5¼	5¼	5½	5½	5½	5¾	6
Upper Deck Clamp where a shelf is also fitted	2	2¼	2½	2½	2¾	2¾	2¾	2¾	3	3	3	3¼	3¼	3¼	3¼	3½	3½	3½	3½	3¾	3¾	4	4	4¼	4½	5
Planksheer	2	2¼	2½	2¾	3	3¼	3½	3¾	3¾	4	4	4	4	4	4	4	4	4	4	4	4	4	4¼	4¼	4½	5
Flat of Upper Deck *(see note at side)*.....	2½	2½	2½	3	3	3	3	3	3	3½	3½	3½	3½	3½	3½	3½	3½	4	4	4	4	4	4	4	4	4
Scarphs of Keelson without Rider	ft. in. 4 6	ft. in. 4 9	ft. in. 5 0	ft. in. 5 3	ft. in. 5 6	ft. in. 5 10	ft. in. 6 2	ft. in. 6 6	ft. in. 6 9	ft. in. 7 0	ft. in. 7 0	ft. in. 7 0	ft. in. 7 0	ft. in. 7 0	ft. in. 7 3	ft. in. 7 3	ft. in. 7 3	ft. in. 7 3	ft. in. 7 6	ft. in. 7 6	ft. in. 7 9	ft. in. 7 9	ft. in. 8 0	ft. in. 8 0	ft. in. 8 0	ft. in. 8 0
Ditto, where Rider Keelson is added, also Scarphs of Keel ..	4 0	4 3	4 6	4 9	5 0	5 2	5 4	5 6	5 9	6 0	6 0	6 0	6 0	6 0	6 3	6 3	6 3	6 3	6 6	6 6	6 9	6 9	7 0	7 0	7 0	7 0
Main Piece of Windlass *(see footnote)* ..... INCHES..	12	14	14	15	15	15	16	16	17	17	18	18	19	19	20	21	21	22	22	23	23	24	24	25	25	27

Upper Decks if of Teak may be reduced *one-sixth*, in thickness, originally 4 inches thick is worn to 3 inches; 3½ inches to 2¾ inches; 3 inches to 2½ inches.

For Moulding, see foot note.

Mouldings of Futtocks and Top Timbers to diminish gradually from size given at Floor Heads to that at Top Timber Heads. *See Rule, sec.* 38.

(a) Should the timber and space be increased, the siding of the timbers to be increased in proportion. *See Rules, Sec.* 39.

(b) When the heels of 1st Foothooks meet at the middle line on the Keel, under the Keelson, either with full moulding, or with Cross Chocks properly butted, the siding of single Floors, and their moulding at the Keelson, may be *reduced* to the siding and moulding allowed for Double Floors.

(c) The rabbet of the Keel, Stem, and Sternpost to be made so as to leave sufficient substance of wood to form a substantial back rabbet.

(d) For breadth of Wales required in every case, *see Section* 45.

(e) All the fore and after hoods, both outside and inside, may be reduced one-sixth in thickness. Furrens are not allowed in this or in any other part of a ship.

(f) This depth of Waterway for Faying Surface against Timbers is required, below the underside of the Planksheer, to receive in and out through Bolts at alternate Timbers, with alternate through bolts in Shelf, and in Clamp where there is no Shelf.

MEM.—For relaxations in respect to Poops, Top-gallant forecastles, and raised quarter decks, *see Rules, sec.* 38. For requirements for Vessels of excessive lengths as compared with breadth and depth, *see Rules, Secs.* 39, 45, *and* 62.

WINDLASS.—The diameter of main piece of windlasses in Steam Ships may be 7/8 of that required in the Table, provided always the body of the windlass be not of unusual length.

TABLE C.

SIDING AND MOULDING OF BEAMS—*Sec.* 41.

LENGTH OF BEAM *amidships.*	HOLD BEAMS		DECK BEAMS	
	sided and moulded.	moulded at ends.	sided and moulded.	moulded at ends.
Feet.	Inches.	Inches.	Inches.	Inches.
10	—	—	4½	3¾
11	—	—	5	4
12	—	—	5½	4¼
13	—	—	5½	4½
14	—	—	5¾	4¾
15	8	6¾	6¼	5¼
16	8½	7	6½	5½
17	8¾	7½	6¾	5½
18	9¼	7¾	7	5¾
19	9½	8	7¼	6
20	10	8½	7½	6¼
21	10¼	8¾	7¾	6½
22	10½	9	8	6½
23	11	9¼	8¼	6¾
24	11¼	9½	8½	7
25	11¾	9¾	8½	7¼
26	12	10	8¾	7¼
27	12¼	10¼	9	7½
28	12½	10½	9	7½
29	12¾	10¾	9¼	7¾
30	13	11	9½	8
31	13¼	11¼	9½	8
32	13½	11½	9¾	8¼
33	13¾	11½	10	8¼
34	14	11¾	10	8½
35	14¼	12	10¼	8½
36	14½	12¼	10¼	8½
37	14¾	12½	10½	8¾
38	15	12½	10½	8¾
39	15¼	12¾	10½	9
40	15½	13	10¾	9

The siding and moulding of *all* the Beams to be the same as those amidships, except those at the *after end* of the Ship, which may be reduced in proportion to their diminished length.

MEM.—When SPRUCE, WHITE CEDAR or YELLOW PINE is used for Beams, the dimensions are to be increased.—*See Rules, Sec.* 40.

N.B.—The size of Orlop Beams to be the mean of the sizes here prescribed.

Lloyd's Register of Shipping,
25th May, 1871.

(SEE OTHER SIDE.)

SUGGESTED TABLE, B 2.

FOR THE THICKNESS OF INSIDE PLANK, &c., IN THE CONSTRUCTION OF SHIPS BUILT IN THE BRITISH NORTH AMERICAN COLONIES AND ALL FIR SHIPS WHEREVER BUILT.

TONNAGE.....Tons	50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1050	1150	1250	1350	1500	1750	2000
Thick Waterway .....inches	5	5¼	5½	6	6	6½	7	7½	7½	8	8	8½	8½	9	9	9½	9½	10	10½	11	11½	12	12½	13	13½	14
Spirketing			3	3¼	3½	3¾	4	4	4¼	4½	4½	4¾	4¾	4¾	5	5	5¼	5½	5¾	5¾	6	6¼	6½	6¾	6¾	7
Ceiling Below Hold Beam Clamp and between Decks	2	2	2¼	2½	2¾	3	3¼	3½	3½	3¾	3¾	4	4	4¼	4¼	4½	4½	4¾	5	5	5¼	5½	5¾	5¾	6	6
Bilge Plank (Inside).....	2½	3	3½	3¾	4	4¼	4½	4¾	5	5½	6	6½	7	7	7½	8	8½	9	9½	10½	11½	12	12½	13	13½	14
Thickstuff over long and short Floorheads, and Limber Strakes.....	2½	2¾	3	3¼	3¼	3½	3¾	4	4¼	4½	4¾	5	5¼	5½	5¾	6	6¼	6½	6¾	7	7¼	7½	7¾	8	8¼	8½
Main Keelsons..... (Rider Keelsons may be two-thirds that of main ditto.)	9	10	11	11¾	12¼	12¾	13¾	14	14½	15	15¼	15½	15½	15½	15¾	15¾	16	16	16¼	16½	16¾	17	17¼	17½	17¾	18

2, *White Lion Court, Cornhill,*
25th May, 1871.

0	300	350	400	450	500	700	900	1350
16	$1\frac{2}{16}$	$1\frac{2}{16}$	$1\frac{3}{16}$	$1\frac{4}{16}$	$1\frac{4}{16}$	$1\frac{5}{16}$	$1\frac{6}{16}$	$1\frac{8}{16}$
6	$\frac{14}{16}$	$\frac{14}{16}$	$\frac{15}{16}$	$\frac{15}{16}$	1	$1\frac{2}{16}$	$1\frac{3}{16}$	$1\frac{4}{16}$
6	1	1	$1\frac{1}{16}$	$1\frac{2}{16}$	$1\frac{2}{16}$	$1\frac{3}{16}$	$1\frac{4}{16}$	$1\frac{6}{16}$
6	$\frac{12}{16}$	$\frac{12}{16}$	$\frac{13}{16}$	$\frac{13}{16}$	$\frac{14}{16}$	$\frac{14}{16}$	$\frac{15}{16}$	1
6	$\frac{11}{16}$	$\frac{11}{16}$	$\frac{12}{16}$	$\frac{12}{16}$	$\frac{12}{16}$	$\frac{12}{16}$	$\frac{13}{16}$	$\frac{14}{16}$
6	$\frac{13}{16}$	$\frac{13}{16}$	$\frac{14}{16}$	$\frac{14}{16}$	$\frac{14}{16}$	$\frac{15}{16}$	1	$1\frac{2}{16}$
3	$2\frac{1}{2}$	$2\frac{5}{8}$	$2\frac{3}{4}$	3	3	$3\frac{1}{4}$	$3\frac{1}{2}$	$3\frac{1}{2}$
8	$1\frac{1}{8}$	$1\frac{1}{4}$	$1\frac{1}{4}$	$1\frac{1}{4}$	$1\frac{3}{8}$	$1\frac{3}{8}$	$1\frac{3}{8}$	$1\frac{1}{2}$

and clenched, as prescribed in *Section* 46, and to be of good quality, well made and be tightly driven.

TABLE E.

NUMBER OF HANGING KNEES
Section 41.

Tons.	To Hold Beams.	To Upper Deck Beams.
	PAIRS.	PAIRS.
150	—	4
200	4	6
250	5	7
300	6	8
350	7	9
400	8	10
450	8	11
500	9	12
550	9	13
600	10	14
650	10	15
700	11	16
750	11	17
800	12	18
900	13	20
1000	14	22
1100	15	24
1350	17	26

900	950	1050	1150	1250	1350	1500	1750	2000
10	10½	11	11½	12	12½	13	13½	14
5½	5¾	5¾	6	6¼	6½	6¾	6¾	7
4¾	5	5	5¼	5½	5¾	5¾	6	6
9	9½	10½	11½	12	12½	13	13½	14
6½	6¾	7	7¼	7½	7¾	8	8¼	8½
16	16¼	16½	16¾	17	17¼	17½	17¾	18

TABLE D.

SIZES OF BOLTS, PINTLES OF RUDDER, AND TREENAILS. *Section* 46.

Tonnage	50	100	150	200	250	300	350	400	450	500	700	900	1350
Heel-Knee, Stemson, and Deadwood Bolts ..... Inches	14/16	15/16	1	1	1 1/16	1 2/16	1 2/16	1 3/16	1 4/16	1 4/16	1 5/16	1 6/16	1 8/16
Bolts in Sister Keelsons, Scarphs of Keel *(a)*, Arms of Breast Hooks, Pointers, Crutches, Riders, Hanging and Lodging Knees to Hold or Lower Deck Beams (except in and out Throat Bolts of Hanging Knees, which must be larger), also in and out Bolts of Shelf, Clamp, and Waterway of Hold or Lower Deck Beams, and the in and out Throat Bolts of Upper Deck Hanging Knees.	11/16	12/16	12/16	12/16	13/16	14/16	14/16	15/16	15/16	1	1 2/16	1 3/16	1 4/16
Keelson Bolts (one through Keel at each Floor), Throats of Transoms, Throats of Breasthooks, and Throats of Hanging Knees to Hold or Lower Deck Beams	12/16	13/16	14/16	14/16	15/16	1	1	1 1/16	1 2/16	1 2/16	1 3/16	1 4/16	1 6/16
Bilge, Limber Strake, and Through Butt Bolts	9/16	10/16	10/16	11/16	11/16	12/16	12/16	13/16	13/16	14/16	14/16	15/16	1
Other Butt Bolts	9/16	10/16	10/16	10/16	11/16	11/16	11/16	12/16	12/16	12/16	12/16	13/16	14/16
Bolts through heels of cant timbers at fore and after Deadwood. In and out Bolts of Upper Deck Waterway, Shelf and Clamp, also Arms of Hanging and Lodging Knees, except in and out Throat Bolts of Hanging Knees, which must be larger	10/16	11/16	11/16	11/16	12/16	13/16	13/16	14/16	14/16	14/16	15/16	1	1 2/16
Pintles of Rudder { The Lower Brace must extend so as to receive not less than Two Bolts on the Planking on each side ..... }	1 7/8	2	2	2 1/4	2 3/8	2 1/2	2 5/8	2 3/4	3	3	3 1/4	3 1/2	3 1/2
Hardwood Treenails	1	1	1	1 1/8	1 1/8	1 1/8	1 1/4	1 1/4	1 1/4	1 3/8	1 3/8	1 3/8	1 1/2

(a) NUMBER OF BOLTS IN SCARPHS OF KEEL:—

In Ships of 150 Tons and under ..... 6 Bolts
" above 150 Tons and under 500 Tons.... 7 do.
" 500 Tons and above ..... 8 do.

} These bolts to be of Copper or Yellow Metal in all cases.

N.B.—Bolts to be through and clenched, as prescribed in *Section* 46, and to be of good quality, well made with suitable heads and be tightly driven.

Lloyd's Register of Shipping, 25th May, 1871.

TABLE E.

NUMBER OF HANGING KNEES
Section 41.

Tons.	To Hold Beams.	To Upper Deck Beams.
	Pairs.	Pairs.
150	—	4
200	4	6
250	5	7
300	6	8
350	7	9
400	8	10
450	8	11
500	9	12
550	9	13
600	10	14
650	10	15
700	11	16
750	11	17
800	12	18
900	13	20
1000	14	22
1100	15	24
1350	17	26

TABLE F.

MINIMUM DIMENSIONS OF IRON KNEES AND KNEE RIDERS FOR BRITISH NORTH AMERICAN BUILT SHIPS AND FIR SHIPS.—*Section 62.*

TONNAGE .....Tons	150	200	250	300	350	400	450	500	550	600	650	700	750	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000
Number of Hanging Knees to Hold or Lower Deck Beams .....Pairs	3 *(a)*	4	6	8	9	Upwards, one Knee Rider to every Beam, or Knees and Riders as per Section 62.																				
Number of Hanging Knees to Upper and Middle Deck Beams .....Pairs	4	6	7	8	9	10	11	12	13	14	15	16	17	18	Upwards, one to every Beam											
Breadth of Knees and Riders to Hold or Lower Deck Beams .....Inches	3	3	3	3	3	3	3¼	3¼	3½	3½	3¾	3¾	4	4	4¼	4¼	4½	4½	4¾	4¾	5	5	5¼	5¼	5½	5½
Breadth of Upper Deck Knees, where there are two Decks, and of Middle Deck Knees, where there are three Decks .....Inches	3	3	3	3	3	3	3¼	3¼	3½	3½	3½	3½	3¾	3¾	4	4	4¼	4¼	4½	4½	4½	4½	4¾	4¾	4¾	4¾
Thickness of Riders at the joints or butts of the Timbers.....Inches	1¼	1¼	1½	1½	1½	1½	1¾	1¾	2	2	2¼	2¼	2½	2½	2¾	2¾	3	3	3¼	3¼	3½	3½	3½	3½	3¾	3¾
Thickness of Knees to Lower Deck or Hold Beams and Knee Riders at the Angle of the Throat .....Inches	2½	2½	2¾	2¾	3	3	3¼	3¼	3½	3½	3¾	3¾	4	4	4¼	4¼	4½	4½	4¾	4¾	5	5	5¼	5¼	5½	5½
Thickness of Knees to Lower Deck or Hold Beams and Knee Riders at the Throat Bolts.....Inches	1¾	1¾	2	2	2¼	2¼	2½	2½	2¾	2¾	2¾	2¾	3	3	3	3	3¼	3¼	3¼	3¼	3½	3½	3½	3½	3¾	3¾
Thickness of Knees to Upper or Middle Deck at the Throat Bolts .....Inches *(b)*	1½	1½	1¾	1¾	2	2	2¼	2¼	2½	2½	2½	2½	2¾	2¾	2¾	2¾	3	3	3	3	3¼	3¼	3¼	3¼	3½	3½
Thickness of Hanging Knees (not Riders) at the ends .....Inches	⅝	⅝	¾	¾	¾	¾	⅞	⅞	⅞	⅞	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Length of Beam Arms of Knees and Knee Riders for Lower Deck or Hold Beams ..... *(c)*	ft. in. 2 6	ft. in. 2 6	ft. in. 2 9	ft. in. 2 9	ft. in. 3 0	ft. in. 3 0	ft. in. 3 3	ft. in. 3 3	ft. in. 3 3	ft. in. 3 6	ft. in. 3 6	ft. in. 3 6	ft. in. 3 9	ft. in. 3 9	ft. in. 3 9	ft. in. 3 9	ft. in. 4 0	ft. in. 4 0	ft. in. 4 0	ft. in. 4 0	ft. in. 4 0	ft. in. 4 0	ft. in. 4 0	ft. in. 4 0	ft. in. 4 0	ft. in. 4 0

NOTE.—The Bolts in all Iron Riders in Hold, to be not more than twenty-one inches apart on the average.

Standards upon the Beams of such Ships are not admitted as substitutes for Hanging Knees below them.

For sizes of Bolts, see Table **D.**

(a) Provided the depth of hold be 13ft. or upwards.

(b) Breadth and thickness of Knees for Upper Deck, where there are Three Decks, may be one sixth less.

(c) Beam Arms of Upper and Middle Deck Knees, may be three inches shorter than those of the Lower Deck.

Side Arms of Hanging Knees not to be less in length, than one and a half the length of their Beam Arms. "*Jumped Knees*" will not be allowed.

Beam Arms of Knees and Knee Riders, which are 3ft. 6in. in length, to have not less than Four Bolts; and shorter than that length, to have not less than Three Bolts.

Side Arms of all Hanging Knees to have at least One Bolt more than in the Beam Arms.

Lloyd's Register of Shipping,
7th March, 1878.

LLOYD'S REGISTER

OF

BRITISH AND FOREIGN SHIPPING.

RULES

FOR

THE BUILDING AND CLASSIFICATION OF STEAM AND

SAILING VESSELS BUILT OF IRON.

INDEX

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RULES

FOR

THE BUILDING AND CLASSIFICATION OF STEAM AND SAILING VESSELS BUILT OF IRON.

All IRON vessels will be classed ⩓ with a Numeral prefixed, so long as, on careful annual and periodical Special Surveys, they are found to be in a fit and efficient condition to carry dry and perishable cargoes to and from all parts of the world. (*See* N.B. at foot).

100⩓, 90⩓, and 80⩓, will denote vessels that have been built in accordance with, or equal to, the Rules, and Tables G 1, G 2, G 3, and G 4. Deviations from the Rules will be allowed, provided that a sketch of the midship section, plans, &c., in each case, showing the proposed scantlings and arrangements, be *first* submitted through the resident Surveyors, and approved by the Committee; and, that the vessels be built in accordance with the approved plans, under the Survey of the Surveyors of this Society.*

Vessels which do not fulfil all the requirements for the 100⩓ class, but which are superior to those built on the 90⩓ scale, may, if the Committee approve, be classed 95⩓; those not equal to the 90⩓, but superior to the 80⩓, may be classed 85⩓; and those which in some respects are deficient of the requirements of the 80⩓ scale, but fit for the ⩓ class, may be classed 75⩓.

Vessels which are built for special purposes, and which are considered fit for such purposes, although not eligible to be classed for the conveyance of dry and perishable cargoes to and from all parts of the world, may be classed ⩓, provided all the details of the scantlings and arrangements be submitted to the Committee for approval.

To the class ⩓ in such cases will be affixed a designation, showing the particular trade or purpose for which the vessels are intended, thus:— ⩓ "For River purposes only." ⩓ "For Tug purposes." ⩓ "Fishing Smack." ⩓ "Yacht." ⩓ "For Channel purposes."

In the latter vessels, the particular channel purposes intended are to be defined thus, "Bristol Channel," "Irish Channel," "English Channel," "Newhaven—Dieppe," &c.; and all vessels classed for Channel purposes must have a load-line, as required in awning-decked vessels, to be submitted for the approval of the Committee.

N.B.—It is to be distinctly understood that the numerals prefixed to the letter ⩓ do not signify terms of years, but are intended for the purpose of comparison only; the ⩓ character assigned being for an indefinite period, subject to annual and periodical Surveys as follows.

* In vessels building, or to be built, under contract for classification, deviations from the Rules will not be allowed by the Committee, unless the Builder shall previously obtain the sanction of the Owner.

N.B.—In reference to the Rules above quoted, and in order to prevent the disappointment arising from Ships losing their Characters from want of survey, it is hereby intimated that the duty of giving NOTICE OF PERIODICAL SURVEYS *required by the Rules, or when repairs are necessary in consequence of damage, or from other causes, rests with the Owners, Masters, or Agents.*

All vessels to be submitted to occasional or annual Surveys when practicable. To entitle them to retain their characters in the Register Book, the following Special Surveys must be held periodically. At the time of any survey, the comparative numeral will depend on the thickness of the plating and angle iron, and the general condition of the vessel.*

‡ **Survey No. 1.**—The vessel to be placed on blocks of sufficient height, in a dry dock, or on ways, the limber boards and ceiling equal to one strake fore and aft on each side removed,§ and both surfaces of outside plating exposed.†

In Steam Vessels the engines and boilers must be examined and favourably reported on by the Society's Engineer-Surveyors. For Periodical Surveys of Engines and Boilers, *see* page 64.

In all vessels the masts, spars, and general equipment must be in good and efficient condition.

If the vessel has a double bottom, all loose ceiling must be removed therefrom and the tanks tested by a head of water to the height of the light water-line to test their efficiency.

‡ **Survey No. 2.**—The vessel to be placed on blocks of sufficient height, in a dry dock, or on ways; the limber boards and ceiling equal to *three* strakes fore and aft on each side removed,§ and both surfaces of outside plating exposed.†

The windlass at this and all subsequent alternate special surveys to be unhung, where necessary, and its wood linings sufficiently stripped, for examination. The chain cables are also to be ranged for inspection.

In steam vessels the engines and boilers must be examined and favourably reported on by the Society's Engineer-Surveyors. (*See* page 64.)

In all vessels the masts, spars, and general equipment must be in good and efficient condition.

If the vessel has a double bottom all loose ceiling must be removed therefrom, and the tanks be tested by a head of water to the height of the light water-line to test their efficiency.

After a vessel has passed No. 3 Survey, in addition to the survey prescribed for No. 2, when that survey becomes due, ceiling should be lifted at other parts of the vessel where deemed necessary by the Surveyors to enable them to satisfy themselves as to the condition of the vessel.

Survey No. 3.—To be held by two Surveyors, one to be an Exclusive Officer of the Society.—The vessel to be placed on blocks of sufficient height, in a dry dock, or on ways; proper stages to be made and the hold to be cleared; all the close ceiling in the hold to be removed, so that the rivets, plates of keel, and flat of bottom may be thoroughly examined; coal-bunkers of steam-vessels to be cleared, the whole of the frames, stringers, hooks, floor-plates, keelsons, engine and boiler bearers, ends of beams, water-tight

* *Expunging or withdrawal of character.—The twelfth, thirteenth, and fourteenth Columns left blank, indicate that the Vessel has never been Classed in the Register Book. Three dots ... in Column* 13 *indicate that the Vessel was at one time Classed by this Society, but that the Class has been withdrawn at Owner's request. A black line with date under it in Column* 14 *indicates that, at that date, the Vessel,* from reported defects, *was not entitled to a Character in the Register Book. A red line with date under it in this Column indicates that the Class was withdrawn from non-compliance, at that date, with the Society's Rules.*

† In cases where the inner surface of the bottom plating is coated with cement, or asphalte, if the coating be carefully inspected and tested, by beating or chipping, and found sound and adhering satisfactorily to the iron, its removal may be dispensed with.

‡ To facilitate the arrangements of Owners, a portion only of the requirements of the foregoing special surveys may be complied with at the expiration of the time specified, provided that the whole of the survey be completed within twelve months. The Surveyors in such cases are to give the Owners, or their agents, written notice of the parts not surveyed, and are also to report the same to the Committee.

§ In the case of vessels fitted with double ceiling, application may be made to the Committee if any relaxation be required.

bulkheads, rivets, and inner surface of the plating to be exposed; all oxidation to be removed by being cut or beaten off the several parts above named, also from the outside plating, rivets, keel, stem, sternpost, and rudder; the planksheers and waterways, if of wood, to be scraped bright. When the vessel is thus prepared, the Surveyors, if they deem necessary, are to ascertain the thickness of the plating by having holes drilled.*

Such parts as may be found defective, or less than three-fourths of the required substance by Rule, are to be removed and replaced with proper materials, equal in substance and quality to the original construction.† The planksheers, waterways, flat of decks and their fastenings, are also to be examined and made good where necessary.‡

In steam vessels the engines and boilers must be examined and favourably reported on by the Society's Engineer-Surveyors. *See* page 64.

In all vessels the masts, spars, and general equipment must be in good and efficient condition.

If the vessel has a double bottom, all loose ceiling must be removed therefrom and the tanks tested by a head of water to the height of the light water-line to test their efficiency.

Upper decks must be renewed when reduced in thickness as follows, viz.:—When a deck originally 4 inches thick is worn to 3 inches, $3\frac{1}{2}$ inches to $2\frac{3}{4}$ inches, 3 inches to $2\frac{1}{2}$ inches.

Every vessel which has been classed from 100A to 90A, inclusive, must be submitted to a special periodical survey every four years;—the first according to No. 1; the second according to No. 2; the third according to No. 3; and afterwards according to Nos. 1, 2, and 3 consecutively, at intervals of four years.§

Vessels classed 85A and under must be subjected to a special survey every *three* years, as per Nos. 1, 2, 3, and afterwards as per Nos. 1, 2, and 3 consecutively.

In all vessels classed 90A and above, No. 3 Survey must be complied with before the expiration of *thirteen* years from the date of build or the previous No. 3 Survey. In vessels classed 85A and under, No. 3 Survey must be complied with before the expiration of *ten* years from the date of build or the previous No. 3 Survey.

Vessels which have undergone either of the foregoing examinations, will be noted in the Register Book, thus: *s.s.No.* 1—79, *s.s.No.* 2—79, *s.s.No.* 3—79, indicating the special survey and date thereof; and any vessel having passed the time when the foregoing surveys have become due, and not being marked as above in the Register Book, will be liable to have her character suspended.

At each of these Special Surveys of vessels propelled by steam, the machinery and boilers are to be examined by the Engineer-Surveyors, and reported upon to the Committee as to their safety and efficiency.

Whenever the engines or boilers are taken out, the bearers, with the floor-plates, keelsons, rivets, &c., under them, may, at the request of the Owners, be surveyed in anticipation of the above Rule; and whenever the bottom plating is to be cemented a survey is to be held prior to the cement being laid.

* In cases where the inner surface of the bottom plating is coated with cement, or asphalte, if the coating be carefully inspected and tested, by beating or chipping, and found sound and adhering satisfactorily to the iron, its removal may be dispensed with.

† Where the deterioration in thickness is widespread, and it is not deemed advisable by the owner to renew the material, on a detailed report being made by the resident Surveyor, the class of the vessel will be reconsidered.

‡ To facilitate the arrangements of Owners, a portion only of the requirements of the foregoing special surveys may be complied with at the expiration of the time specified, provided that the whole of the survey be completed within twelve months. The Surveyors in such cases are to give the Owners, or their agents, written notice of the parts not surveyed, and are also to report the same to the Committee.

§ Should a ship at any time be submitted to Special Survey No. 3 before being 12 years old, the subsequent Special Surveys may be Nos. 1, 2, and 3, consecutively, dating from the completion of such No. 3 Survey.

SURVEYS WHILE BUILDING.

SPECIAL SURVEY.

The Surveyors are to examine during the progress of a vessel, the materials and workmanship, from the laying of the keel to her completion; and to point out as early as possible anything that may be objectionable.

In steam vessels built under Special Survey, the Machinery and Boilers must also be constructed under Special Survey.

ORDINARY SURVEY.

1st. On the several parts of the frame, when in place complete, and before any plating is wrought.

2nd. On the plating, during the progress of riveting.

3rd. When the beams are in and fastened, before the decks are laid.

4th. When the vessel is complete, but before the plating is finally coated or cemented.

5th and last. After the vessel is launched and equipped.

SURVEY OF MACHINERY.

In vessels propelled by steam the machinery and boilers are to be inspected throughout construction, the boilers tested by hydraulic pressure, and the machinery tested under steam. Machinery certificates will be granted, and notifications thereof made in the Register Book, thus: "L.MC. 3,82" *in red* (*i.e.* LLOYD'S MACHINERY CERTIFICATE, March, 1882). (*See* Section 39.)

In cases of machinery or new boilers being built under Special Survey, the distinguishing mark ✠ will be noted in red, thus: "✠L.MC.," or "✠N.E.&B.," or "✠N.B."

SPECIAL SURVEY OF NEW ENGINES OR BOILERS.

The Surveyors are to examine the materials and workmanship from the commencement of the work until the final test of the machinery under steam; any defects &c., to be pointed out as early as possible.

The Surveyors may also, if desired, compare the work as it progresses with the requirements of the specification agreed upon by the parties concerned, and certify to the conditions thereof, as far as can be seen being satisfactorily complied with.

ORDINARY SURVEY OF NEW ENGINES OR BOILERS WILL BE AS FOLLOWS.

1. On the different parts of the engines during erection.
2. On the sea connections while being fitted to the vessel.
3. On the boiler plates when they are bent, flanged and holed, ready for riveting, and on stays, &c., while being fitted.
4. Testing the boilers by hydraulic pressure.
5. When engines and boilers are being fixed on board the vessel.
6. At the setting and testing of safety valves and trying the machinery under steam.

PERIODICAL SURVEYS. (*See* N.B. at foot.)

The machinery and boilers of all steam ships are to be surveyed annually if practicable, and in addition to be submitted to a Special Survey every four years upon the occasion of the vessels undergoing the Special

N.B.—In reference to the Rules above quoted, and in order to prevent the disappointment arising from Ships losing their Characters from want of survey, it is hereby intimated that the duty of giving NOTICE OF PERIODICAL SURVEYS *required by the Rules, or when repairs are necessary in consequence of damage, or from other causes, rests with the Owners, Masters, or Agents.*

periodical Surveys Nos. 1, 2, and 3, prescribed in the Rules, and the boilers to Special Survey when six years old, and subsequently to Annual Survey.

At these Special Surveys the propeller, stern-bush, and fastenings of the sea connections are to be examined while the vessel is in dry dock, and, if deemed necessary by the Surveyor, the stern shaft is to be drawn and examined.

The cylinders, pistons, slide valves, crank shaft, and pumps are to be examined, and if necessary the condenser is to be examined and tested.

The boilers and superheaters are to be examined, and if deemed necessary by the Surveyors are to be drilled or tested by hydraulic pressure; the safe working pressure is to be determined by their actual condition.

The safety valves are to be examined and set to the safe working pressure.

The sea connection and arrangement of cocks, pipes, bilge suctions, roses, &c., are to be examined.

If satisfactory, these surveys will be recorded in the Register Book thus:—"L.MC. 5,82" *in red;* "B.&M.S. 5,82" *in red.*

"L.MC." (LLOYD'S MACHINERY CERTIFICATE) with a date, denotes that the machinery and boilers are fitted in accordance with the Rules, and were found upon examination at that time to be in good condition.

"B.&M.S." (BOILERS AND MACHINERY SURVEYED), with a date, denotes that the boilers and machinery, though not fitted strictly in accordance with the Rules, were found upon inspection at that time to be in good condition.

"B.S." (Boilers Surveyed), with a date, denotes that the boilers were found upon inspection at that time to be in good condition.

In the event of either the machinery or boilers appearing to be impaired to such an extent as renders it desirable that either or both be specially surveyed within the periods prescribed above, a Certificate for either machinery or boilers for a limited period will be granted according to the nature of the case.

RULES FOR THE BUILDING OF IRON VESSELS.

Section 1. The scantlings given in Tables G 1, G 2, and G 3, are intended for vessels the length of which does not exceed *eleven times* their depth, *from the top of keel.* Where this proportion is exceeded, *see* Sect. 46.

For proportions of breadth to length, *see* Table G 4.

The measurements for regulating the proportions are to be taken as follows:—

LENGTH.

The length to be measured from the after part of the stem to the fore part of the sternpost, on the range of the upper deck beams, in one, two, and three-decked and spar-decked vessels, but on the range of main deck beams in awning-decked vessels.

In vessels where the stem forms a cutwater, the length is to be measured from the place where the upper deck beam line would intersect the after edge of stem if it were produced in the same direction as the part below the cutwater.

BREADTH.

The breadth is in all cases to be the greatest moulded breadth of the vessel.

DEPTH.

The depth in one and two-decked vessels is to be taken from the upper part of the keel to the top of the upper deck beam amidships. In spar-decked vessels and awning-decked vessels, the depth is to be taken from the upper part of the keel to the top of the main deck beam amidships. For three-decked vessels *see* Section 41.

SCANTLINGS.

Section 2. The scantlings of the frames, reversed frames, and floor-plates, the thickness of bulkheads and the diameter of pillars in Table G 1, are regulated by numbers, which are produced as follows:—

For one and two-decked vessels.—The number is the sum of the measurements in feet, arising from the addition of the half-moulded breadth of the vessel amidships, the depth from the upper part of the keel to the top of the upper deck beams, and the girth of the half midship frame section of the vessel, measured from the centre line at top of keel to the upper deck stringer plate.

For three-decked steam vessels.—The number is produced by the deduction of seven feet from the sum of the measurements taken to the top of the *upper* deck beams. (*See* Section 41.)

For spar-decked vessels and awning-decked steam vessels.—The number is the sum of the measurements in feet, taken to the top of the main deck beam, as described for vessels having one or two decks.

The scantlings of the keel, stem, sternposts, keelson and stringer plates, the thickness of the outside plating and deck; also the scantlings of the angle irons on beam stringer plates, and keelson and stringer angle irons in hold, as in Tables G 1, G 2, and G 4, are governed by the number obtained by multiplying that which regulates the size of the frames, &c., by the length of the vessel.

QUALITY OF IRON.

Section 3. The whole of the iron to be of a good malleable quality, capable of withstanding a tensile strain of 20 tons per square inch with, and 18 tons across, the grain, and to be subjected to tests at the discretion of the Surveyors. Brittle or inferior material to be rejected.

All plate, beam, and angle iron to be legibly stamped in two places with the manufacturer's name or trade mark, and the place where made, which is also to be stated in the report of survey.

WORKMANSHIP.

Section 4. The workmanship to be well executed, and submitted to the closest inspection, and amended where necessary before coating or painting: it is not intended to prevent the coating of the plates *inside* in the way of the frames.

KEEL, STEM, STERN, AND PROPELLER POSTS.

Section 5. The keel, stem, stern, and propeller posts are to be either scarphed or welded together, and to be in size according to Table G 1; if scarphed, the length of scarphs to be nine times the thickness given in the table for keels; and the rivet holes required in the *thin* ends of them are recommended to be drilled after the scarphs are fitted.

Where the garboard strakes are thicker than required by the Rules, the thickness of the keel may be proportionately reduced.

Where the keel and keelsons are made of several thicknesses of plates, the plates that form the keel to be in thickness, taken together, the same as is required for a solid keel, as per Table G 1; and the butts of the several plates of which the keel is formed to be carefully shifted from each other.

When **Hollow or flat keel plates** are adopted, their breadth must be the same as given for the garboard strakes, and their thickness not less than once and a third that prescribed for those strakes, for three-fifths the vessel's length amidships. The plates before and abaft this length may be gradually reduced to the thickness of the garboard strakes amidships; and the strake of plating on each side adjoining the flat keel plates to be of the thickness required for the garboard strakes in Table G 1.

Where flat plate keels are used, intercostal keelson plates, or centre through-plates, must be fitted close down on the keel, and connected to it by double angle irons of the dimensions given for keelson angle irons in Table G 2, riveted all fore and aft to the keel and keelson. (*See* also Section 9, paragraph 6.)

The butt-straps of flat keel plates are to be one-sixteenth of an inch thicker than the plates they connect, and treble riveted.

The stem at its lower part is to be the same moulding as the keel, and attached to it by a scarph of the same length as the keel scarph; it may be gradually reduced from the height of the load-line to its head, where it may be three-fourths of the sectional area given in Table G 1.

The stern and propeller posts, and after end of keel, for single screw propelled vessels, to be of the size given in Table G 1, for stern frames, or of equal sectional area; the portion adjoining the keel to be tapered fair into it. In a sailing vessel, or paddle steamer, the sternpost may be reduced from the lower part of the rudder trunk to its head, where it may be three-fourths of the sectional area given in the Table; and, in a steam vessel having a propeller frame, it may be reduced at the head to the size given in the Table.

The portion of the forging of the stern frame, forming part of the keel, is to extend sufficiently forward for the after end of its scarph *in sailing vessels and paddle steamers* to be at least once and a half the frame space before the sternpost, and *in screw propelled vessels* at least twice and a half the frame space before the propeller post.

The sternpost is to be extended well above the counter, and securely attached at its head to an iron deck or plate, and to a transom plate which should not be less in depth than once and a half the depth of the midship floor-plate, and of the same thickness. And in screw steamers whose plating number is 20,000 and above, the foremost or propeller post should extend to the height of the middle deck, and be efficiently connected to it, or to iron plating on the beams, and to a deep transom plate.

The rudder braces are to be forged on the sternpost, and spaced from 4 ft. to 5 ft. 6 in.

FRAMES.

Section 6. The frames to be of the dimensions set forth in Table G 1; to be in as great lengths as possible, fitted close on to the upper edge of the keel; and at the extreme ends of the vessel the lower parts of the frames opposite to each other are to be lapped and riveted together; and in all vessels to extend to the gunwale. Where either raised quarter-decks, poops, or forecastles, are constructed, the frames are to extend to their deck stringers respectively, except when constructed of a rounded form at the gunwale; they may then terminate at the lower part of the curve.

When the frames are butted on the keel they are to have not less than three feet lengths of

corresponding angle iron, fitted back to back, to cover and support the butts and receive the plating for at least three-fourths the vessel's length amidships. Similar pieces of angle iron are to be fitted, if the frames are butted elsewhere.

The rivet holes to be punched through from the faying surfaces of the frames, and they are not to be punched at the turn of the bilge until the frames are bent to the required shape; the holes in way of the lands of the plating are to be drilled after the plating is wrought.

The spacing of the frames from centre to centre to range from twenty to twenty-six inches, according to the size of the vessel, which spacing should not be exceeded around the stern of the vessel at the knuckle. (*See* Table G 1.)

FLOOR-PLATES.

Section 7. The floor-plates to be in size at the middle line according to Table G 1, for half the length amidships, excepting under the engines and boilers in steam vessels, where they must be one-sixteenth of an inch thicker, when the thickness prescribed in Table G 1 is nine-sixteenths of an inch or under.* They are to be moulded not less than one-half their midship depth† at a distance of three quarters the half breadth of the vessel set out from the middle line on the run of the frame, and not less at their extreme ends than the moulding of the frames; and they are to extend in a fair curve well up the bilges, in no case terminating lower at the outside of the frame than a perpendicular height of twice the midship depth of floor above the top of keel. The ends of the floors to maintain the height prescribed, for one quarter of the vessel's length amidships, they may then be gradually lowered forward and aft until the upper edges of the floor-plates are level (this place to be determined by the form of the vessel), from which to her ends they are to be gradually increased in depth, so as to efficiently connect her sides; the upper parts of the floors forward and aft are to be high enough to give ample room between the reversed frames, on each side of the vessel, for fitting the keelson angle irons.

The thickness of the floor-plates for half the vessel's length amidships to be as given in Table; but for one quarter of her length at each end they may be reduced in thickness one-sixteenth of an inch when the plates amidships are six-sixteenths and above; and when the plates amidships are nine-sixteenths in thickness, and above, they may be reduced one-sixteenth of an inch for an eighth of the vessel's length before and abaft the half-length amidships, and the remainder may be two-sixteenths of an inch less in thickness than the midship floors.

A floor-plate to be fitted and riveted to every frame, and to be extended across the middle line, except where a vertical centre-plate is adopted, in which case the floor-plates are to be efficiently connected to it on each side by double vertical angle irons of not less size than the reversed frames.

When floors are made in two lengths, the butts are to be well fitted, and to have double butt-straps treble riveted; or, the floor-plates may be lapped and treble riveted.

Floor-plates to which the bulkheads are attached must be deeper than the adjacent floor-plates, to admit of the bulkheads being riveted to them above the reversed angle irons.

* Where a double bottom extends through the engine and boiler space, the floors need not be increased in thickness, provided the top plating of the double bottom be increased one-sixteenth of an inch in thickness.

† In vessels of unusual form, in which it may be considered desirable to depart from this condition, the approval of the Committee must be obtained thereto.

WATERCOURSES are to be formed above the frames through all the floor-plates, on each side of the middle line, also at the lower turn of the bilges in vessels of full form, as well as through the vertical centre-plate, and intercostal keelsons, when such keelsons are adopted, so as to allow water to reach the pumps freely.

Transom-plates are to be fitted and connected to the frames, and to the sternpost where practicable, so as to efficiently support the counter.

REVERSED ANGLE IRONS ON FRAMES.

Section 8. Reversed angle irons on frames to be in size as per Table G 1.

Vessels where the number for regulating the size of the frame is below 45, to have reversed angle irons riveted to every frame and floor-plate, extending across the middle line to the upper part of the bilges.

Vessels where the number, as per Rule, is 45 and below 57, to have reversed angle irons riveted to every alternate frame and floor-plate, extending across the middle line to the upper part of the double angle iron stringer above bilges, and on the remaining floor-plates and frames to the gunwale; or, if the vessel is of a depth to require hold beams, the reversed angle irons are to extend to the upper part of the hold beam stringer angle iron and gunwale alternately.

All vessels, except those having an awning-deck, where the number, as per Rule, is 57 and upwards, to have reversed angle irons on every frame, extending alternately to the upper deck stringer plate, and top of angle iron on stringer plate next below it. In awning-decked vessels they are all to extend to the upper part of the main deck stringer angle iron.

In *sailing vessels* where the number, as per Rule, is 75 and upwards, the reversed frames are to extend to the gunwale on every frame.

Double reversed angle irons to be fitted on every floor, extending from bilge to bilge, in the engine and boiler spaces of steam vessels; and, where the vessel is of 15 feet depth or above from the hold beams, they are to extend sufficiently high to admit of the stringer at upper part of bilge being connected to them. Short double reversed angle irons are also to be fitted on all frames in way of the keelsons and stringers in hold.

The butts of reversed angle irons, excepting those at middle line, to be secured with butt straps, having not less than two rivets on each side of the butt.

The rivets for securing the reversed angle iron to the frames and floor-plates to be in diameter in proportion to the greatest thickness of angle, or plate iron, through which they pass, as specified in Table G 1, and to be spaced eight times their diameter, from centre to centre.

In vessels where the plating number is 20,000 and above, reversed angle irons should be fitted to every frame to the height of the upper or spar deck abaft the after peak bulkhead; and in addition where such vessels have broad flat counters, a double angle iron stringer should be fitted midway between the middle and upper or spar deck beams for a reasonable length, connected by plate knees to the transom plate.

MIDDLE LINE KEELSONS.

MIDDLE LINE SINGLE PLATE KEELSON.

Section 9. The middle line keelson, if of single plate, and standing above the floor-plates, to be of the size prescribed in Table G 2, and to have angle irons, of the dimensions given in the same Table, fitted and riveted on its upper and lower edges. In addition there is to be a rider plate, on the top of the

keelson plate, extending over *three-fourths* of the length of the vessel amidships, riveted to the angle irons, the breadth of which is to be equal to the sum of the two broad flanges of the keelson angle irons together with the thickness of the centre plate it covers; the thickness of the rider plate not to be less than prescribed in Table G 2. The butts of the plates and angle irons forming this keelson to be properly shifted, and to be efficiently butt-strapped.

The butts of the vertical plate to be secured with double butt-straps, each not less than two-thirds of the thickness of the plates they connect, and to be treble riveted; the butt-straps of the rider plate to be fitted on the upper side, and to be treble riveted; the butt-straps of the angle irons to be of sufficient length to have not less than three rivets properly arranged on each side of the butt.

Vessels in which the number for plating is 33,000 and above, are to have a foundation plate not less than eighteen inches broad and ten-sixteenths of an inch thick fitted on the top of the floors under the middle line plate keelson.

MIDDLE LINE BOX KEELSON.

If a box keelson be adopted, it is to be formed of plates, properly shifted, of the thickness given in Table G 2, with a foundation plate; the depth to be the same as that prescribed for single plate keelsons; the angle irons to be of the size given in Table G 2. The box is to maintain its depth for half the vessel's length amidships, it may then be gradually reduced to two-thirds of the same at the extreme ends.

MIDDLE LINE INTERCOSTAL KEELSON.

If a middle line intercostal keelson be adopted, the plates are to be of the thickness prescribed in Table G 2, and riveted to vertical angle irons of not less size than the reversed frames, to be fitted and attached to all floor-plates; the intercostal plates to extend from the keel to the top of the floors, and to be fitted close to them. A bulb plate, at least two inches deeper than required for the main deck beams, is to be let down below the top of the floors, between the reversed angle irons, sufficiently for the intercostal plates to be riveted thereto, and the bulb to be fitted between, and riveted to, two longitudinal angle irons on the floors, extending all fore and aft, of the size given for keelson angle irons in Table G 2; or, the letting down of the bulb plate may be dispensed with, if the intercostal plates are extended to the upper edge of the longitudinal angle irons.

When intercostal keelsons are adopted with hanging keels, in vessels where the number for plating is 13,000 and under 18,000, instead of a bulb plate there is to be a centre vertical plate let down and attached to the intercostal plates below the top of floors, having double continuous angle irons at top and bottom, and a rider plate on its upper edge, of the sizes given in Table G 2; the vertical plate and the rider plate are to be of the thickness required for stringer plates in upper line of Table G 4, and the depth above the floors to be sufficient to admit of the angle irons being properly fitted. When the number is 18,000 and above, the vertical plate and the rider plate are to be of the thickness given in Table G 2 for main keelsons, and the depth of the vertical plate above the floors to be not less than three-fourths of that given in the said Table.

Where **Flat plate keels** are used, intercostal keelson plates, or centre through-plates, must be fitted close down on the keel, and connected to it by double angle irons of the dimensions given for keelson angle irons in Table G 2, riveted all fore and aft to the keel and keelson. In vessels where the number for plating is 13,000 and under 15,000, or where the length exceeds ten times the depth, instead of a bulb plate, there is to be a centre vertical plate let down and attached to the intercostal plates below the top of floors,

or connected to the centre through-plate, having double continuous angle irons at top and bottom, and a rider plate on its upper edge; the vertical plate and the rider plate are to be not less in thickness than that given in the upper line of Table G 4 for stringer plates, and the depth above the floors to be sufficient to admit of the angle irons being properly fitted. Where the number is 15,000 and above, the vertical plate and the rider plate are to be of the thickness given in Table G 2 for main keelsons, and the depth of the vertical plate above the floors to be not less than three-fourths of that given in the said Table. Where the number is 26,000 and above, the flat-plate keel should be doubled for one-half the vessel's length amidships.

CENTRE THROUGH-PLATE KEEL AND KEELSON.

If the middle line keelson be formed of a centre through-plate, extending from the lower edge of the keel to the top of the floors, it must be two-sixteenths of an inch thicker than that required in Table G 2 for intercostal keelsons. To strengthen the floor-plates transversely at their intersection at the middle line, in addition to the double vertical angle irons riveted to their ends and to the centre plate keelson, there is to be a flat keelson plate, of the same thickness as, and not less than three-fourths the breadth of, the garboard strakes in Table G 1, riveted to double reversed angle irons on the upper edge of floors, and to two fore and aft angle irons on the upper edge of the centre through-plate keelson; and where the number for plating is 15,000, and under 18,000, there is to be a bulb plate of the size of the main deck beams, fitted between, and riveted to, two longitudinal angle irons of the size for keelson angle irons in Table G 2, connected to flat plate keelsons and double reverse bars on top of floors. But, should the centre through-plate keelson be extended above the upper edge of the floors, then it is to be connected by two fore and aft angle irons, of the size given in Table G 2, to two flat plates, one on each side of the middle line, to be one-sixteenth of an inch thicker than that given for intercostal plates, and one-third the breadth of the garboard strakes, to be well riveted to the double reversed angle irons on the upper edge of the floors. Where the number is 18,000 and above, the centre through-plate keelson is to extend sufficiently high above the floor-plates to take two pairs of double angle irons of the size given for keelson angle irons, and there is to be a rider plate fitted on the top of the thickness of the keelson plate.

In all cases the middle line keelson is to be extended as far forward and aft as practicable.

BILGE KEELSONS, AND STRINGERS IN HOLD.

Section 10. All vessels to have bilge keelsons, extending all fore and aft, and placed at the lower turn of the bilges, formed of double angle irons fitted back to back, of the size given in Table G 2.

If the vessel has but a single tier of beams and her number in Table G 2 is under 7,200, a side stringer, formed of the same size angle irons, is to be fitted about midway between the bilges and upper deck, extending all fore and aft.

Where the number is 7,200 and above, and the vessel is under 14 feet depth of hold, two double angle iron stringers are to be fitted on each side between the bilge keelsons and the deck beams, the upper pair to extend three-fifths of the vessel's length amidships, and the lower pair to extend all fore and aft, to be riveted back to back and to double reversed angle irons on the frames; the size of them not to be less than those used for the middle line keelson.

For stringers in hold, *see also* Section 14.

SIDE KEELSONS.

Section 11. In vessels where the number in Table G 2 is 13,000, and under 15,000, a double angle iron keelson is to be fitted on each side, as far forward and aft as practicable, and to be placed about midway between the middle line and bilge keelsons.

Where the number is 15,000, and upwards, intercostal plates are to be fitted on each side, as far forward and aft between the floors as practicable, and to be placed about midway between the middle line and bilge keelsons; these plates are to be fitted close to the floors, and to be attached to the outside plating with an angle iron of not less size than $3 \times 3 \times \frac{7}{16}$, but, if the plating number is 21,700 or above, these angle irons must not be less than $3\frac{1}{2} \times 3\frac{1}{2} \times \frac{8}{16}$; they are to extend to the top of the floors, and longitudinal plates, in long lengths of the same thickness as the intercostal plates, are to be let down and riveted to them. These plates are to be fitted between, and riveted to, two longitudinal angle irons of the size given for keelson angle irons; or the longitudinal plates may be dispensed with if the intercostal plates are extended to the upper edge of the longitudinal angle irons and riveted to them.

Side intercostal plates or side keelsons need not be fitted in the range of double bottoms; but, where partial double bottoms are fitted, these keelsons are to extend into, or scarph the double bottom not less than three spaces of frames, and to be connected to the longitudinal girders where practicable.

Vessels not being of a size to require side intercostal keelson plates are to have washplates, of the thickness given for bulkheads in Table G 1, fitted between the middle line and bilge keelsons, for not less than half the vessel's length amidships.

DETAILS RELATING TO KEELSONS AND STRINGERS.

Section 12. Where bulb iron is used for keelsons or stringers, the joints to be overlapped and riveted, or otherwise efficiently connected; if overlapped, the length of lap must not be less than twice the depth of the bulb plate; iron of other form than bulb may be used for them, if of equal strength.

All angle irons for keelsons and stringers are to be in long lengths, properly shifted; and wherever butted to be connected with angle or plate iron, not less than two feet long, fitted in the throat of them, properly riveted to each flange. The thickness of the connecting plates not to be less than the thickness of the angle irons they connect.

In all cases the middle line, side, and bilge keelsons, and, where practicable, the stringers, are to be carried fore and aft, continuously through the bulkheads, the latter being made watertight around them; and, where such parts of the ship are necessarily separated, the longitudinal strength is to be efficiently maintained, to the satisfaction of the Surveyors.

All middle line and intercostal keelson plates may be reduced in thickness forward and aft, to the same extent as allowed in the floor-plates; or the former may be proportionately reduced in depth at the ends of the vessel.

All keelson and stringer angle irons may be reduced one-sixteenth of an inch in thickness, when above seven-sixteenths of an inch amidships, for one-fifth the vessel's length at each end.

BEAMS.

Section 13. Beams are to be of the form and size given in Table G 3; or they may be composed of any other approved form, equal in strength.

In sailing ships where the length of the midship hold beam exceeds 39 feet, the hold beams should be one inch more in depth than prescribed in Table G 3, unless they be additionally pillared.

All beams to be well and efficiently connected or riveted to the frames, with bracket ends or knee-plates; each arm of knee-plates not to be less in length than twice and a half the depth of beams, and to be in thickness equal to the beams; and not more than two holes in each beam arm to be punched before the beam is in place.

It is recommended that the round up of the beams of all weather decks should not be less than one quarter of an inch per foot of length of beam. In the case of awning-decked vessels (where a load-line is required), the draught of water, for insertion in the Register Book, will be fixed in reference to a freeboard assuming this round up.

The beams of the various decks, or of tiers of beams, are to be placed over each other. *For reductions in sizes of beams at the ends of vessels, see Table G 3.*

If the beams of the several decks in steam vessels of 43 feet and upwards in breadth be supported by a double row of pillars stepped upon the side keelsons, the depth of the main and lower deck beams may be one inch less than given in Table G 3, and the depth of the upper deck beams in three deck vessels may be half an inch less than given in the Table. (*See* Section 15.)

SPACING OF BEAMS, AND STRINGERS IN HOLD.

Section 14. The spacing of beams, or the arrangement of stringers substituted for beams, is to be regulated by the *depth amidships,** measured from the upper part of floor-plates of the depth given in Table G 1, to the top of the upper, spar, or awning-deck beams. (*See also* Section 10, paragraphs 2 and 3.)

All upper deck beams and the middle deck beams of three-decked ships, and the main deck beams of spar and awning-decked ships, to be fastened to alternate frames.

All *Vessels under* 12 *feet in depth* are to have a double angle iron stringer extending all fore and aft, about midway between bilge keelson and deck beams, riveted back to back and to double reversed angle irons on the frames, or to single lug pieces of the size of the frames.

All *Vessels of* 12 *and under* 13 *feet in depth* to have, in addition to the foregoing, bulb iron of the size required for their deck beams, riveted between the continuous double angle iron stringer for three-fifths the vessel's length amidships; or the bulb iron may be dispensed with, provided that, in lieu thereof, intercostal plates in long lengths be fitted between the double angle iron stringer, and attached by single angle iron to the outside plating.

All *Vessels of* 13 *and under* 14 *feet in depth* to have, instead of the bulb iron, as described above, a plate not less than 12 inches wide and $\frac{7}{16}$ thick, with double angle irons fitted on the inner edge the size of the keelson angle irons, and extending all fore and aft, and supported by brackets at every third frame.

All *Vessels of* 14 *feet depth and above* to have a double angle iron stringer of the size given in Table G 2, extending all fore and aft at the upper turn of the bilge on each side.

All *Vessels of* 14 *and under* 15 *feet in depth* to have hold beams of extra strength, as given in

* In vessels constructed with a double bottom extending all fore and aft, the depth for regulating the beams may be taken from the inner bottom, provided bracket frames be extended in a fair curve up the bilges to the same extent above the height of the inner bottom at the middle line, as required by the Rules for floors in vessels having single bottoms. For depth under raised decks *see* Section 45.

Table G 3, fastened to every tenth frame, with a stringer plate of the size given in Table G 4 for hold beam stringers, attached to the plating and supported by brackets at every alternate frame between the beams, and secured to the beams by efficient gusset plates.

All *Vessels of* 15 *and under* 16 *feet in depth* to have hold beams of extra strength, as given in Table G 3, fastened to every *tenth* frame, with a stringer plate on them attached to the side plating of the size given in Section 16, and to have at each beam end an efficient gusset plate riveted to the beam and stringer plate. On the inner edge of the stringer plate, between the beams, an angle iron is to be fitted, of the size given for keelson angle irons in Table G 2, with its deep flange vertical, and covering the ends of the bracket plates.

All *Vessels of* 16 *and under* 17 *feet in depth* to have hold or lower deck beams fastened to every second and fourth frame alternately, or they may have hold beams of extra strength, as given in Table G 3, fastened to every *tenth* frame, with an angle iron on the inner edge of the stringer plate, and gusset plates at the beam ends, as in the preceding case.

All *Vessels of* 17 *and under* 18 *feet in depth* to have hold or lower deck beams fastened to every second and fourth frame alternately; or, they may have hold beams as described in the foregoing paragraph, fastened to every *tenth* frame, provided double angle irons, $3\frac{1}{2} \times 3\frac{1}{2} \times \frac{7}{16}$, be fitted on the inner edge of the stringer plate with a face plate $\frac{7}{16}$ of an inch in thickness, and gusset plates at the beam ends.

SAILING VESSELS *of* 18 *and under* 21 *feet in depth* to have hold or lower deck beams fitted to every alternate frame.

SAILING VESSELS *of* 21 *and under* 22 *feet in depth* from the upper part of the upper deck beams, or *of* 14 *and under* 15 *feet* from the upper part of the hold or lower deck beams to the top of the floors, to have the lower deck beams fitted to every alternate frame, and to have two double angle iron stringers extending fore and aft, between the bilge keelson and hold or lower deck beams, on each side.

SAILING VESSELS *of* 22 *and under* 24 *feet in depth* from the upper part of the upper deck beams, *or* 15 *and under* 16 *feet* from top of lower deck beams, to have the lower deck beams fitted to every alternate frame, and to have, in addition to the above, bulb plates of the size of the hold beams fitted and riveted between each of the two side stringers in lower hold on both sides, to extend all fore and aft at the upper stringer, and for one-half the vessel's length amidships at the lower stringer.

SAILING VESSELS *of* 24 *and under* 25 *feet in depth* from the upper deck beams, or 16 *and under* 17 *feet in depth* from top of lower deck beams, to have the lower deck beams fitted to every alternate frame, and instead of bulb plates (as above described) to have plates 12 inches by $\frac{10}{16}$ inch fitted between the two double angle iron side stringers, with double angle irons of the size required for keelsons, fitted on their inner edge, extending for a similar length.

SAILING VESSELS *of* 25 *and under* 26 *feet in depth* from upper deck, or *of* 17 *and under* 18 *feet in depth* from top of lower deck beams, are to have the lower deck beams fitted to every alternate frame, and to have orlop stringer plates of the dimensions required for hold beam stringer plates in Table G 4 fitted and attached to the outside plating and reversed frames by angle irons of the size given in Table G 2. These stringers must be supported by bracket plates riveted to them, and to alternate frames; and upon the inner edge of the stringer plate an angle of the size of keelson angle irons, as per Table G 2, is to be fitted and riveted, so that its vertical flange may cover the ends of the bracket plates.

SAILING VESSELS *of* 26 *and under* 27 *feet in depth* from the upper deck, or *of* 18 *and under*

20 *feet* from the top of lower deck beams, to have the lower deck beams fitted to every alternate frame, and to have orlop beams of the size given on Table G 3 for "hold beams of extra strength" fitted to every *tenth* frame, or these beams may be *twelve* frame spaces apart, provided double angle irons, $4 \times 3\frac{1}{2} \times \frac{7}{16}$, be fitted on the inner edge of the stringer plate with their deep flange vertical, and with a face plate $\frac{8}{16}$ of an inch in thickness.

STEAM VESSELS *of* 18 *and under* 20 *feet in depth* to have hold beams fastened to every alternate frame; or hold beams of extra strength, as given in Table G 3, may be fitted to every *eighth* frame, provided an angle iron, of the size given for keelson angle irons in Table G 2, be fitted on the inner edge of the stringer plate, and to have at each beam end an efficient gusset plate riveted to the beam and stringer plate; or these beams may be spaced wider, not exceeding *ten* frame spaces, provided double angle irons, $3\frac{1}{2} \times 3\frac{1}{2} \times \frac{7}{16}$, and a face plate, $\frac{8}{16}$ of an inch in thickness, be fitted on the inner edge of the stringer plate, with gusset plates as above.

STEAM VESSELS *of* 20 *and under* 21 *feet in depth* to have, in addition to the foregoing, an extra side stringer, formed of double angle irons of the size of the keelson angle irons, fitted between the hold beams and bilge stringer, extending as far forward and aft as practicable.

STEAM VESSELS *of* 21 *and under* 22 *feet in depth* to have, in addition to the above, a bulb plate, of the size required for hold beams, fitted between the double angle irons of each of the side stringers for half the vessel's length amidships.

STEAM VESSELS *of* 22 *and under* 24 *feet in depth* from the upper part of the upper deck beams, *or of* 15 *and under* 16 *feet* from the upper part of the lower deck beams to the top of the floors, to have the lower deck beams fitted to every alternate frame, and to have hold beams of extra strength, as given in Table G 3, fastened to every *tenth* frame, with a stringer plate on them attached to the side plating, of the size given in Table G 4 for hold beam stringer plates; and to have at each beam end an efficient gusset plate riveted to the beam and stringer plate; and on the inner edge of the stringer plate, between the beams, an angle iron is to be fitted, of the size given for keelson angle irons in Table G 2, with its deep flange vertical, and covering the ends of the bracket plates.

STEAM VESSELS *of* 24 *and under* 25 *feet in depth* from the upper deck, or 16 *and under* 17 *feet* from top of the middle deck beams, to have hold beams fastened to every second and fourth frame alternately, or they may have hold beams of extra strength, as given in Table G 3, fastened to every *eighth* frame; and to have an angle iron on the inner edge of the stringer plate, and gusset plates at the beam ends, as in the preceding case, or, they may be spaced wider, not exceeding *ten* frame spaces, provided double angle irons, $3\frac{1}{2} \times 3\frac{1}{2} \times \frac{7}{16}$, be fitted on the inner edge of the stringer plate, with a face plate on them $\frac{7}{16}$ of an inch in thickness.

STEAM VESSELS *of* 25 *and under* 26 *feet in depth* from the upper deck, or 17 *and under* 18 *feet* from the top of the middle deck beams, to have hold or lower deck beams fastened to every second and fourth frame alternately; or they may have hold beams of extra strength, as given in Table G 3, fastened to every *eighth* frame, and to have an angle iron on the inner edge of the stringer plate, and gusset plates at the beam ends, as in the preceding case, or these beams may be *ten* frame spaces apart, provided double angle irons, $4 \times 3\frac{1}{2} \times \frac{7}{16}$, be fitted on the inner edge of stringer plate with their deep flange vertical, and with a face plate $\frac{8}{16}$ of an inch in thickness.

STEAM VESSELS *of* 26 *and under* 28 *feet in depth* from the upper deck, or 18 *feet and under* 20 *feet* from

the top of the middle deck beams, to have hold or lower deck beams fastened to every alternate frame; or, if hold beams of extra strength, as given in Table G 3, be fitted, they may be fastened to every *eighth* frame, provided an angle iron of the size given for keelson angle irons in Table G 2, be fitted on the inner edge of the stringer plate, and gusset plates be fitted as in the previous case; or these beams may be spaced wider, not exceeding *ten* frame spaces, provided double angle irons, $4 \times 4 \times \frac{8}{16}$, and a face plate $\frac{9}{16}$ in thickness be fitted on the inner edge of the stringer plate, with gusset plates at the beam ends.

STEAM VESSELS *of* 28 *and under* 30 *feet in depth* from the upper deck, or 20 *and under* 22 *feet* from the top of the middle deck beams to have hold or lower deck beams fastened to every alternate frame, or if hold beams of extra strength, as given in Table G 3, be fitted, they may be fastened to every *eighth* frame, provided an angle iron of the size given for keelson angle irons in Table G 2 be fitted on the inner edge of the stringer plate, and gusset plates be fitted as in the previous case; or these beams may be spaced wider, not exceeding *ten* frame spaces, provided double angle irons, $4 \times 4 \times \frac{8}{16}$, and a face plate, $\frac{9}{16}$ in thickness, be fitted on the inner edge of the stringer plate with gusset plates at the beam ends, and in addition a double angle iron stringer of the size given for keelson angle irons in Table G 2 is to be fitted midway between the bilge stringer and the hold beams.

STEAM VESSELS *of* 30 *and under* 33 *feet in depth* from the top of the upper deck beams to the top of floors, or in which the depth from the top of the *lower* deck beams *is* 15 *and under* 18 *feet*, to have the lower deck or hold beams fitted to every alternate frame, and to have below them an orlop stringer plate attached to the outside plating and reverse frames, of the thickness and three-fourths of the breadth, of the lower deck stringer plates, supported by bracket plates riveted to them and to alternate frames; and upon the inner edge of the stringer plate an angle iron, of the size of keelson angle irons, as per Table G 2, is to be fitted and riveted, so that its vertical flange may cover the ends of the bracket plates; or a stringer of other form may be fitted, if approved by the Committee.

STEAM VESSELS *of* 33 *and under* 36 *feet in depth* from the top of the upper deck beams to the top of floors, or in which the depth from the top of the lower deck or hold beams *is* 18 *feet or above*, are to have the lower deck beams fitted to every alternate frame, and to have orlop beams, of the size given in Table G 3 for "hold beams of extra strength," fitted to every *tenth* frame, with stringer plates on them, and gusset plates at their ends.

Plans of all vessels above 36 feet in depth, or where the height between decks is 8 feet or above, at any part, to be submitted to the Committee, with a view to increased transverse strength being provided for such part.

When the beams exceed two spaces of frames apart, a knee or bracket plate is to be riveted to alternate frames and to the stringer plate.

Notwithstanding the foregoing arrangements for the spacing of beams, whenever a deck is laid the beams are not to be further apart than two frame spaces.

Where it is necessary, in consequence of long hatchways, engine-rooms, boiler spaces, &c., to dispense with some of the hold or lower deck beams, compensation must be made by fitting hold beams of extra strength, as given in Table G 3, with gusset plates, and angle irons, &c., on the stringer plates,—regulated by the depth of the vessel, in accordance with the foregoing paragraphs of this Section.

If an arrangement differing from the foregoing in the spacing of the hold beams, to suit convenience of stowage, be required, a sketch showing beams and stringers of extra strength, or web frames, with all parti-

culars, must be submitted through the Resident Surveyors, who are to state their opinion thereon, for the Committee's consideration.

TO PREVENT PANTING.

All vessels must have provision made to prevent panting, by extra beams, bracket knees, and stringer plates being fitted in the peaks, forward in sailing vessels and paddle steamers, and forward and aft in screw-propelled vessels and all vessels having a raised quarter-deck; the sizes, arrangement, and security of them to be to the satisfaction of the Surveyors.

In vessels having fine ends, these stringer plates are to be attached to the outside plating with an angle iron; and beams and stringer plates are to be fitted before the collision bulkhead, and also abaft, where necessary.

PILLARS.

Section 15. All beams, for at least three-fourths the length of the vessel amidships, the alternate beams before and abaft this length, and all carlings of hatchways, exceeding in length six spaces of frames, to be pillared; in addition, the beams under deck houses, bowsprit, pall bitt, windlass, steam winches, and capstan are to be pillared, and wherever else the Surveyors may deem necessary; the pillars to have not less than two rivets in each of their ends, so as to form a continuous tie from the keelson to the upper, spar, or awning-deck, and to be of the sizes given in Table G 1. Where a vessel has three decks or tiers of beams, the size of the pillars to the middle tier is to be a mean between the sizes given in Table G 1.

In vessels of 43 feet and upwards in breadth, it is recommended that the beams be supported by a double row of pillars stepped upon the side keelsons, in which case the depth of the main and lower deck beams may be one inch less than given in Table G 3, and the depth of the upper deck beams in three deck vessels may be half an inch less than given in the Table. (*See* Section 13.)

All pillars to have solid welded heads and heels.

Pillars which extend from the keelson to the upper deck beams in vessels with two decks, or tiers of beams; or to the middle deck beams in vessels with three decks, or tiers of beams; and the hold pillars in sailing ships of 22 feet depth of hold and above, are to have their diameter increased by three-eighths of an inch beyond that given in Table G 1.

When split pillars are fitted for the purpose of securing shifting boards, each of the separate parts of the pillar where split should be made at least half an inch larger than the half of the single pillar required by the Rules, and the parts are to be efficiently connected by bolts or otherwise to the satisfaction of the Surveyors.

Where hollow pillars are to be used, the diameter and thickness of the same are to be submitted for the approval of the Committee.

If pillars be fitted on a shaft tunnel, the tunnel should be strengthened in way of them, by doubling plates, angle irons, and a transverse vertical plate, or by other efficient means to the satisfaction of the Surveyors. Great care is to be taken to insure the beams in the engine room being pillared where practicable.

STRINGERS ON BEAMS.

Section 16. All vessels to have stringer plates upon the ends of each tier of beams. Those upon the ends of the upper deck beams of one, two, and three-decked vessels, and upon the main deck beams of spar and awning-decked vessels to be of the breadth and thickness given for main stringer plates in Table G 4

for half the vessel's length amidships; from thence to the ends of the vessel they may be gradually reduced to the dimensions given for the ends of main stringer plates in Table G 4.

The stringer plates on ends of the beams next below the upper deck in two-decked vessels, and below the middle deck in three-decked vessels, and below the main deck in spar or awning-decked vessels, to be of the total breadth and thickness given for hold beam stringers in Table G 4.

The stringer plates on ends of middle deck beams, of three-decked vessels, to be of the same width as that given in Table G 4, but they may be one-sixteenth of an inch less in thickness.

The stringer plates on the ends of spar-deck beams are to be the breadth of, and may be two-sixteenths of an inch less in thickness, than the stringer plates given on the upper line of Table G 4 for vessels of the same plating number, and may be reduced at their ends to seven-sixteenths of an inch, and to the breadth given for the ends of main deck stringer plates in Table G 4.

The stringer plates on the ends of awning-deck beams to be of the same width as given in Table G 4 for hold beam stringer plates, and to be six-sixteenths of an inch in thickness when the plating number is under 14,000, and seven-sixteenths of an inch in thickness when the plating number is 14,000 and under 26,000 and eight-sixteenths, when the plating number is 26,000 and above.

The stringer plates on all tiers of beams are to be fitted home, and riveted to, the outside plating, all fore and aft, with angle irons of the dimensions required by Table G 2; the middle, lower, and orlop deck stringer plates to have an additional angle iron extending all fore and aft, riveted to the reversed frames, and to the stringer plates.

Where there would be considerable bevel to the angle iron fitted on the stringer plate and to the reversed frame *aft*, the angle iron may be omitted for one-twelfth of the vessel's length at that end, and flanged plates substituted for angle irons at this part for attaching the stringer plates to the outside plating.

In cases where no deck is laid, and the width of the stringer plate on the ends of the hold beams is objected to, it may be reduced, provided such reduction be fully compensated for, and receive the sanction of the Committee.

The objectionable practice of cutting through the stringer plates for the admission of wood roughtree stanchions will not be allowed. When the frames are extended through the upper deck stringer plate to form roughtree stanchions or bridge-houses, or poops and forecastles, there must be a continuous angle iron, of the size given for upper deck stringer angle irons, wrought on the upper deck stringer plate inside the frames.

The main and hold beam stringer plates may be reduced at the ends of the vessel to the sizes given for the same in Table G 4. Where a reduction of two-sixteenths of an inch in thickness is allowed, the stringer plates may be reduced one-sixteenth of an inch in thickness for one-eighth of the vessel's length before and abaft the half-length amidships, and from thence to the ends they may be reduced another sixteenth of an inch in thickness.

A lining piece should be fitted behind the upper deck stringer angle iron in one, two, three-decked, and spar-decked vessels, from butt-strap to butt-strap of the sheerstrake when single, to admit of those butt-straps being in one length, the lining piece being the thickness of the butt-straps, and increased in depth in way of scuppers to admit of being riveted to the sheerstrake above and below the upper deck stringer plate,—unless the sheerstrake extend sufficiently high above the stringer plate to admit of a butt-strap being fitted above the stringer in the throat of the angle iron, and extending high enough to take two rows of rivets vertically above the angle iron. When the sheerstrake is doubled above the stringer plate it should be extended sufficiently

high above the latter to take two rows of rivets vertically in the butts above the upper flange of the gunwale angle iron.

The upper deck stringer angle iron is in all cases to be fitted on the upper side of the stringer plate, with its deep flange vertical and turned upwards.

When gutter waterways are fitted to upper decks in vessels having poops or forecastles, the angle irons forming the ends of the gutters are to be welded, and the gutters to be carefully caulked; and it is recommended that, when completed, they be cemented.

TIE-PLATES ON BEAMS.

Section 17. All vessels to have tie-plates ranging all fore and aft upon each side of the hatchways, *on each tier of beams*, these plates to be lapped or butted, and at least double riveted. Upon hold beams where no deck is to be laid, or where tie-plates would interfere with stowage of cargo, double angle irons of the dimensions given in Table G 2 for angle irons on lower deck beam stringer plates, placed at middle line or at each side of the hatchways, extending fore and aft wherever practicable, and well riveted to all beams, deck hooks, and transoms, will be admitted in lieu thereof.

Diagonal tie-plates are to be fitted on the beams of all sailing vessels in way of the masts at the deck on which they are wedged, and in addition, where the plating number is 15,000 and above, diagonal tie-plates are to be fitted all fore and aft on the upper deck.

Where diagonal tie-plates cross each other, or the fore and aft tie-plates, between the beams, and a deck is to be laid thereon, one set of tie-plates must be set down in way of the crossing, so as to leave one thickness only projecting above the beams.

The tie-plates to be of the width and thickness given in Table G 4, for half the vessel's length amidships, tapered at the ends to the same thickness as the ends of the stringer plates. They are to be well riveted to each other, and to the beams, deck hooks, and transoms; and all butts to be properly shifted.

HOOKS AND CRUTCHES.

Section 18. All stringers, where practicable, to extend fore and aft, and to be efficiently connected at their ends with plates forming hooks and crutches of the same thickness as the floor plates amidships, and those below the hold beams should be spaced about four feet apart. In vessels whose plating number is 24,000, or above, an additional hook or crutch should be fitted at the ends of the vessel, between each tier of beams, to the satisfaction of the Surveyors.

PLATING.*

Section 19. The thickness of plating for half the vessel's length amidships, to be as given in Table G 1, and may be tapered towards the ends of the vessel as described below; but in sailing vessels where the plating number is 16,000, or above, three strakes of plating at the bilges are to be increased one-sixteenth

* When plates have to be doubled, the butts of these plates and of the doubling plates are to have butt-straps double riveted, and, in addition, these double plates are to be well riveted at the edges and middle of the plates between the frames in addition to the rivets which pass through the frames, and the middle of the plates to be riveted up before the edges; all butts of inside strakes to be riveted complete, independent of the outside strakes.

In no case is the treble riveting of the butts at the bilges to be dispensed with, excepting in the case of the strake or strakes, which are doubled.

of an inch in thickness throughout, and when the plating number is 22,000 and above, the strake of plating in way of the hold beams is to be increased one-sixteenth of an inch in thickness, for one-half the vessel's length amidships.

No plates to be less in length than five spaces of frames, except the fore and after hoods.

No butts of outside plating in adjoining strakes to be nearer each other than two spaces of frames, and the butts of the alternate strakes not to be under each other, but shifted not less than one frame space.

The butts of the upper or main deck, and of spar-deck stringer plates, in all cases, to be shifted not less than two spaces of frames clear of the butts of the sheerstrakes.

The butts of the garboard strakes to be shifted clear of the keel scarphs, and not to be nearer each other on opposite sides of the vessel than two spaces of frames.

All butts of plating, where practicable, to be planed and fitted close; the edges of the plating to be sheared from their faying surfaces, or the burr caused by shearing to be carefully chipped off, and all outside edges of plating are to be either planed or chipped fair. The butts and edges to be carefully caulked.

The thickness of the sheerstrakes amidships to be as given in Table G 1, and their breadth to be not less than 30 inches where the number for plating is under 7,200; not less than 33 inches where the number is 7,200 and under 11,800; not less than 36 inches where the number is 11,800 and under 16,600; and not less than 40 inches where the number is 16,600 and above; except where the thickness is greater than prescribed, in which case the breadth may be diminished, provided the sectional area be not less than required by the Rules.

The sheerstrakes in one, two, three-decked, and spar-decked vessels, where the butt-straps do not extend to the upper edge in one length, to be fitted sufficiently high above the upper deck beam ends, so as to take two rows of rivets vertically in the butts above the upper flange of the gunwale angle iron.

The garboard strakes to be of the breadth and thickness amidships given in Table G 1.

The garboard strakes of screw-propelled vessels, if ten-sixteenths of an inch or more in thickness amidships, may be reduced one-sixteenth of an inch before and abaft the half length of the vessel; if nine-sixteenths of an inch and not less than seven-sixteenths, they may be reduced one-sixteenth of an inch *before* the half length only.

The garboard strakes of sailing vessels or paddle steamers, if seven-sixteenths of an inch or more in thickness, may be reduced one-sixteenth of an inch before and abaft the half length of the vessel.

The outside plating, if not less than six-sixteenths of an inch in thickness amidships, may be reduced one-sixteenth of an inch for a fourth of the vessel's length at each end. But the garboard strakes and boss plates in all screw steamers, and also the after hoods of plating connected to the stern frame, where the plating number is 16,600 and above, must be retained of the thickness required for the same strakes amidships.

When the plates are ten and under twelve-sixteenths of an inch in thickness amidships, a reduction will be allowed of one-sixteenth of an inch for an eighth of the vessel's length before and abaft the half length amidships, and the remaining plates at the ends may be two-sixteenths of an inch less in thickness than those of their respective strakes amidships. When the plates are twelve-sixteenths of an inch or more in thickness amidships, they may be reduced three-sixteenths at the extreme ends of the vessel.*

* In sailing vessels the outside or overlapping strakes of plating for one quarter of the vessel's length at her fore end should only be reduced one-sixteenth of an inch from the midship thickness.

The boss-plates covering the screw shaft are to be the same thickness as the strakes amidships of which they form part, where the number for plating is under 14,300; if that number and under 18,700, the plates are to be one-sixteenth of an inch thicker; and if the number is 18,700 and under 26,400 the plates are to be one-sixteenth of an inch thicker than the midship plating, and the butts treble riveted; and, where the number is 26,400 and above, the boss-plates and the plates above and below the same to be two-sixteenths of an inch thicker than the midship plating, and their butt-straps extended from frame to frame; or the boss-plates are to be doubled.

When plates forming the outside strakes of plating exceed forty inches, or those forming the inside strakes exceed forty-eight inches in breadth, and they come within the half length of the vessel amidships, their butts are to be treble riveted.

Where gutter waterways are adopted at the upper deck, the butt-straps of the bulwark plating are to be sufficiently broad to receive the spur in the middle of the bulwark stay; and when the plates do not exceed twelve feet in length they are to have stays fitted against the butt-straps, and an intermediate stay is to be fitted between the butts. In no case are the stays which support the bulwarks to be more than six feet apart. Their size may be from $1\frac{3}{8}$ in. to 2 in. in diameter, regulated by the length of the stay and the size of the vessel. These arrangements may be modified according to circumstances, if to the satisfaction of the Surveyors.

BUTT-STRAPS.*

Section 20. In vessels where the plating number does not exceed 8,000, the butt-straps of the sheerstrake, deck stringer plates, and one strake at the bilges for half the vessel's length amidships, are to be one-sixteenth of an inch thicker than the plates they connect, and be double riveted. When the plating number is above 8,000, and not exceeding 13,000, the butt straps of the deck stringer plates, sheerstrake, and two strakes of plating round the bilges are to be one-sixteenth of an inch thicker than the plates they connect for half the vessel's length amidships and treble riveted.

When the plating number is above 13,000, and not exceeding 17,000, the butt-straps of deck stringer plates, sheerstrake, and three strakes of plating round the bilges are to be one-sixteenth of an inch thicker than the plates they connect for half the vessel's length amidships and treble riveted.

When the plating number is above 17,000, and not exceeding 24,000, the butt-straps are to be one-sixteenth of an inch thicker than the plates they connect, and treble riveted for four strakes of plating around the bilges, instead of three, as above, for half the vessel's length amidships.

When the plating number is above 24,000, and not exceeding 28,000, in addition to the above the butt straps of the remaining outer alternate strakes of plating are to be one-sixteenth thicker than the plates they connect and treble riveted for half the vessel's length amidships.

Where the plating number is above 28,000, and not exceeding 33,000, the whole of the butt-straps are

* When plates have to be doubled, the butts of these plates and of the doubling plates are to have butt-straps double riveted, and, in addition, these doubling plates are to be well riveted at the edges and middle of the plates between the frames in addition to the rivets which pass through the frames, and the middle of the plates to be riveted up before the edges; all butts of inside strakes to be riveted complete, independent of the outside strakes.

In no case is the treble riveting of the butts at the bilges to be dispensed with, excepting in the case of the strake or strakes, which are doubled.

to be one-sixteenth of an inch thicker than the plates they connect, and treble riveted for half the vessel's length amidships.

Where the plating number is above 33,000, and not exceeding 40,000, the whole of the butt straps are to be two-sixteenths of an inch thicker than the plates they connect, and treble riveted for two-thirds the vessel's length amidships.

A lining piece should be fitted behind the upper deck stringer angle iron in one, two, three-decked, and spar-decked vessels, from butt-strap to butt-strap of the sheerstrake when single, to admit of those butt-straps being in one length, the lining piece being the thickness of the butt-straps, and increased in depth in way of scuppers to admit of being riveted to the sheerstrake above and below the upper deck stringer plate,—unless the sheerstrake extend sufficiently high above the stringer plate to admit of a butt-strap being fitted above the stringer in the throat of the angle iron, and extending high enough to take two rows of rivets vertically above the angle iron. When the sheerstrake is doubled above the stringer plate, it should be extended sufficiently high above the latter to take two rows of rivets vertically in the butts above the upper flange of the gunwale angle iron.

All butt-straps to be of the breadth given in Table G 1, and in no case to be less in thickness than the plates they connect; the fibre of the iron to be in the direction of the fibre of the plates they connect.

LINING PIECES.

The space between the plating and the frames to have solid filling or lining pieces in one length, closely fitted; to be of the same breadth as the frames, excepting in way of bulkheads, where they are to be fitted as stated in Section 22, Paragraph 5.

RIVETING AND RIVETS.* (See also Table G 5.)

Section 21. The landing edges of outside plating when seven-sixteenths of an inch in thickness and above from the keel to the upper turn of bilge, *and of the sheerstrake;* and when nine-sixteenths of an inch and above from the upper turn of bilge to the gunwale, must be double riveted; below these thicknesses the edges may be single riveted. In all cases the thicker of the two plates is to regulate the size of the rivets, and the requirements as to double riveting. When the plating is of a thickness amidships to require the edges to be double riveted, the same is to be continued all fore and aft. The stem, sternpost, keel, butts of outside plating, breasthooks, transoms, stringer and tie-plates on beams, also butts of keelsons, stringers, and all longitudinal ties, to be at least double riveted in all vessels.

The butts of outside plating to be chain riveted. All double and treble riveting, except in the keel, stem, and sternpost, is recommended to be chain riveting.

* When plates have to be doubled, the butts of these plates and of the doubling plates are to have butt-straps double riveted, and, in addition, these doubling plates are to be well riveted at the edges and middle of the plates between the frames in addition to the rivets which pass through the frames, and the middle of the plates to be riveted up before the edges; all butts of inside strakes to be riveted complete, independent of the outside strakes.

In no case is the treble riveting of the butts at the bilges to be dispensed with, excepting in the case of the strake or strakes, which are doubled.

N.B.—Table G 5, showing diameters and spacing of rivets, &c., has been amended, as shown in the accompanying copy thereof, dated 22nd December, 1881.

In chain-riveted butts, a space equal to twice the diameter of the rivet to be between each row; where treble riveting is adopted, a space equal to twice the diameter of the rivet to be between each row, with half the number of rivets in the back row.

The overlaps of plating, where chain riveting is adopted, are not to be less than six times the diameter of the rivets; and, where single riveting is admitted, to be not less than three and a half times the diameter of the rivets.

The butts of side plating of partial awning-decks, poops, top-gallant forecastles, and bulwarks, may be *single* riveted.

The rivets are not to be nearer to the butts or edges of the plating, butt-straps, or of any angle iron, than a space equal to their own diameter; and, in edge riveting, the space between any two consecutive rows of rivets must not be less than once and a half their diameter.

The rivet holes to be regularly and equally spaced and carefully punched from the faying surfaces opposite each other in the adjoining parts, laps, lining pieces, butt-straps, and frames; and countersinking to extend through the whole thickness of the plate or angle bar. *They are to be spaced not more than four diameters of the rivet apart from centre to centre in the butts of the plating, and not more than from four to four and a half diameters apart in the edges of the plating and at other parts,* excepting in the keel, stem, and sternpost, where they may be five diameters, and through the frames and outside plating, and in reversed angle irons on frames, where they may be eight diameters apart from centre to centre. The rivets in the flanges of the gunwale angle irons to be spaced not more than four and a half diameters apart from centre to centre; and those connecting iron decks and stringer plates to the beams to be spaced from seven to eight diameters apart.

For arrangement of rivets showing minimum number in each frame space in the edges of plating amidships, *see* Table G 5.

There are not to be less than four rivets in each flange of the angle irons between the frames which connect the stringer plates and intercostal plates to the outside plating, where the spacing of the frames from centre to centre is twenty-three inches and above; but, where the frames are closer spaced, there are not to be less than three rivets.

The rivets are to be of the best quality, and to be in diameter as per Table G 5, and to be increased in size under their heads to fill the rivet holes. When riveted up, the rivets are completely to fill the holes, their heads are to be "laid up," and their points or outer ends are not to be below the surface of the plating.

BULKHEADS.

Section 22. Screw-propelled vessels, in addition to the engine-room bulkheads, to have a water-tight bulkhead built at a reasonable distance from each end of the vessel. In steamers 280 feet long and above, an additional bulkhead is to be fitted in the main hold about midway between the collision and engine room bulkheads, *and extending to the upper deck in vessels with one, two, or three decks, and to the spar deck in spar-decked vessels, and to the main deck in awning-decked vessels;* and in steamers of 330 feet long and above, an additional bulkhead is to be fitted in the after hold extending to the same height.

The foremost or collision bulkhead in all cases to extend from the floor-plates to the upper deck, and its water-tightness is to be tested by hose or other means, and to be in position to the satisfaction of the Surveyors.

The engine-room bulkheads to extend from the floor-plates to the upper deck, in vessels with one, two, or three decks; and to the spar deck in spar-decked vessels, and main deck in awning-decked vessels. The aftermost bulkhead will be required to extend to the height of the upper deck, unless the arrangement of bulkheads be submitted to, and approved by, the Committee. This bulkhead is to be made water-tight by a stuffing box where the screw shaft passes through, and its water-tightness is to be tested by the after compartment being filled with water.

In sailing vessels the foremost or collision bulkhead only will be required.

All plating of bulkheads to be of the thickness prescribed in Table G 1; and to be fitted between two frames at each side of the vessel, and to be strongly riveted to them. Lining pieces between frames and outside plating, in way of bulkheads, are to extend in one piece from the foreside of the frame afore to the aftside of the frame abaft the bulkhead frames.

The bulkheads to be supported vertically on one side, and horizontally on the other with angle irons of not less size than required for the *main* frames. The vertical angles to be not more than two feet six inches apart, and on the opposite side of the bulkheads the horizontal angles should not exceed four feet apart below where they are supported by a laid deck. In vessels of forty feet breadth and above, the engine room bulkheads should be additionally strengthened by a vertical web at the middle line, extending from the keelson to the hold beams, or by other means, to the satisfaction of the Committee. All such bulkheads to be caulked and made thoroughly water-tight.

The upper half depth of bulkhead plating may be one-sixteenth of an inch less in thickness than the lower half when the latter is six-sixteenths of an inch or above in thickness.

WOOD DECKS.

Section 23. The flat of decks, if of wood, to be of good quality, properly seasoned, free from sap and objectionable knots; the thickness and fastenings as per Table G 2.

In all cases the margin or boundary planks of weather decks in vessels intended for the 90A class or above, to be either Teak or Greenheart.

If the deck is of teak, it may be *one-sixth* less in thickness than prescribed in Table G 2.

When the deck planks are six inches in width and under, single fastening will be sufficient; but when they are above six inches, and not exceeding eight inches in width, there must be two bolts in each plank in every beam, one of which may be a short screw bolt; and planks exceeding eight inches in width must be double fastened with nut and screw bolts.

The upper deck to be fastened by screw bolts, with nuts at the under side of the angle iron of the beams, and tie-plates. The bolts must be properly sunk, *with oakum and white lead under their heads*, and be carefully covered over with turned dowels, bedded in white lead, marine glue, or other suitable composition. It is recommended that the screw bolts be galvanized. For size of bolts, see Table G 2.

Upper decks must be renewed when worn in thickness as follows, viz.:—When a deck originally required to be 4 inches thick is worn to 3 inches; $3\frac{1}{2}$ inches to $2\frac{3}{4}$ inches; 3 inches to $2\frac{1}{2}$ inches.

IRON DECKS. (See also Table G 4.)

Where iron decks are fitted of six-sixteenths of an inch in thickness and under, and no wood deck is laid on the same, beams of angle iron, or angle bulbs, of the sizes given in Table G 3, are to be fitted to every

frame, except at the ends of the hatchways, where they are to be of bulb iron, of the size required by the Rules for vessels of the same breadth having no iron deck. Where these angle irons or angle bulbs are fitted to every frame, a stringer is to be fitted at the middle line of the vessel to the under side of the iron deck, formed of a bulb plate scored over the vertical flange of the beams, and connected to the deck by angle irons. Or any other approved web may be fitted if extending sufficiently below the beams to admit of the pillars being riveted to the same.

Where iron decks exceed the above thickness, bulb iron beams may be fitted to alternate frames in the usual manner, *but angle iron or angle bulb beams to every frame, except at the ends of hatchways, are considered preferable.* Where no wooden deck is to be laid on the iron deck, angle iron half beams, of the size given in Table G 3 are to be fitted to every frame in the way of all hatchways.

When the deck plating is seven-sixteenths of an inch in thickness amidships, it may be reduced one-sixteenth of an inch before and abaft the half length amidships; when eight-sixteenths thick amidships, it may be reduced to seven-sixteenths for an eighth of the length before and abaft the half length, and the remainder to six-sixteenths of an inch.

If a wood flat be laid over an iron upper deck, it may be half an inch less in thickness than prescribed by Table; and in such cases the iron deck, if six-sixteenths of an inch in thickness, may be reduced one-sixteenth of an inch before and abaft the half length; if seven-sixteenths in thickness amidships, it may be reduced to six-sixteenths for an eighth of the length before and abaft the half length, and the remainder to five-sixteenths of an inch. *The wooden flat should in addition be efficiently secured between the beams to the iron deck.*

The butts of the iron deck to be double riveted for half the length amidships; and, where large openings are cut in iron decks, compensation is to be given for the same.

If a wood flat be laid over an iron middle deck, it may be $2\frac{1}{2}$ inches in thickness.

Where a vessel has an iron deck for half her length amidships, or beyond, but not a complete iron deck, or where there are one, two, or three iron decks; or one, two, or three iron decks, and in addition, a partial iron deck as before described, the same will be inserted in the Register Book thus—pt Iron dk; 1 Iron dk; 1 Iron & pt Iron dk; 2 Iron dks; &c., &c., as the case may be.

DOUBLE BOTTOMS.

Section 24. Vessels fitted with a double bottom for the purpose of water-ballast extending throughout the whole or part of the length of the vessel, will have the same denoted in the Register Book, together with its length and capacity. (*See* Key to Register Book.)

Side intercostal plates or side keelsons need not be fitted in the range of double bottoms; but, where partial double bottoms are fitted, these keelsons are to extend into, or scarph the double bottoms not less than three spaces of frames, and be connected to the longitudinal girders where practicable.

"Manholes," with wrought-iron covers, must be constructed, or provision made for the removal of a portion of the plates so as to enable the inner surface of outside plating, the frames, floors, keelsons, and rivets to be thoroughly examined and coated when required, and in way of the manholes in the inner bottom plating, doubling plates or rims should be fitted to receive the fastening of the covers. The double bottom to be made water-tight, and all water-tight joints to be tested on completion with a head of water at least equal to the extreme draught of water of the vessel.

All water-tight joints to have the surfaces of iron fitted close to each other and caulked, without, as far as practicable, the use of felt, canvas, &c.

The upper side of the plating must be protected with wood planking as ceiling, in no case to be less than $2\frac{1}{2}$ inches in thickness, the same to be laid on battens, to admit of drainage water passing to the well.

Where a double bottom extends through the engine and boiler space, a *well* should be formed between the engine-room after bulkhead and the floor immediately before the same, for the drainage of water, or *open* gutter ways of sufficient size should be made in the wings, so as to be always accessible.

All loose ceiling on double bottoms to be removed, when the tanks are required by the Rules to be tested.

It is of importance that ample provision should be made for the free passage of air from one division to another, so that it may readily find its way to the air pipes. This should be done by fitting the liners short, setting down the angle iron from the inner bottom or top of deep tank wherever necessary, and leaving otherwise a sufficient number of holes as near to the inner bottom as practicable. The air pipes should also be sufficient in number and size; and, wherever necessary, one should be fitted at each end of each tank on both sides of the vessel.

No class will be assigned to vessels having a double bottom, or part double bottom, unless such double bottom, or part double bottom, be constructed in accordance with the requirements of the Rules, or of strength equal to that prescribed thereby.

For record of double bottoms, &c., in the Register Book, *see* the Key to the Register in the Appendix to the Rules.

DOUBLE BOTTOMS FORMED WITH GIRDERS ON TOP OF ORDINARY FLOORS.

Where double bottoms are fitted with longitudinal girders extending on top of ordinary floors, the inner or second bottom must be efficiently constructed and made water-tight; the plating of it not to be less than five-sixteenths of an inch in thickness, where the vessel's number is under 11,000; if of that number or above, it is to be six-sixteenths of an inch in thickness, and the flange or side plate in each instance must be one-sixteenth of an inch thicker. The double bottom to be efficiently connected to the outside plating and frames of the main body of the vessel; and when reversed frames are cut, they must be compensated for by doubling the frames with short angle irons of their own size. The butts of the flange-plate to be double riveted; the butts and edges of the remaining plates may be single riveted.

Where double bottoms are fitted in the fore and after holds, and not extended through the engine-room, great care should be taken to provide against an abrupt termination in the longitudinal girders; they are either to be carried through the engine-room, or fully compensated for, by connection with the longitudinal engine and boiler bearers, or otherwise, to the satisfaction of the Surveyor. *The longitudinal girders should be connected to double reversed angle irons on the floors.*

Where double bottoms, or part double bottoms, are fitted with longitudinal girders on the floors, all the outside plating (except the garboard strakes) which is entirely within the boundary of them, may be one-sixteenth of an inch less in thickness than that prescribed in Table G 1, provided that thickness be ten-sixteenths of an inch or more.

CELLULAR DOUBLE BOTTOMS.

The scantlings of the various parts of the double bottom are to be as given in Table G 6, and the spacing of the longitudinal girders should be from 42 inches to 54 inches, according to the size of the vessel.

In vessels whose plating number is 17,000 and under, triangular bracket plates of the thickness given in Table G 6 may be fitted at alternate frames; but under the engines solid floor plates of the same thickness, lightened by manholes and with double angle irons on the upper edge, are to be fitted at every frame, and at alternate frames under the boilers. Where the plating number exceeds 17,000, instead of bracket plates, solid floor plates lightened by manholes are to be fitted throughout the whole length of the double bottom. In all vessels where flat plate keels are adopted, and in vessels having hanging keels whose plating number is 22,000 and above, bracket plates are to be fitted to the centre girder at the intermediate frames, and in all vessels, bracket plates inside and outside the double bottom are to be fitted to the margin plate to every frame all fore and aft.

Intermediate angle irons are to be fitted for stiffening the inner bottom plating, unless the longitudinal girders are more closely spaced than given above and solid floors are fitted to alternate frames, when they may be dispensed with, if approved by the Committee.

Hanging keels, when adopted with this system of construction, are to be formed of side plates on each side of the centre girder, which is to extend down to the lower edge of keel.

The inner bottom plating to be continuous and wrought longitudinally. The butts to be shifted well clear of each other and of the butts of the longitudinal girders, and the edges to be shifted well clear of the latter.

The butts and edges of the middle line strake, all fore and aft, and also the butts of the inner bottom plating in the engine and boiler space, are in all cases to be double riveted. Where the plating number is 20,000 and under 30,000, the butts of the inner bottom plating are to be double riveted for half the vessel's length amidships. Where the plating number is 30,000 and under 38,000, the butts of the inner bottom plating, and the edges of an additional strake on each side of the middle line, are to be double riveted throughout.

The butts of the side girders and margin plate are to be double riveted; and in vessels whose plating number is under 21,000, the butts of the centre girder are to be connected by double butt straps, double riveted. When the plating number exceeds 21,000, the butts are to be treble riveted, with the alternate rivets in the back row omitted. The double butt straps, in all cases, to be each not less than two-sixteenths of an inch thicker than half the thickness of the plates they connect.

The rivets in the butts and edges of the inner bottom plating and girders are to be spaced not more than four diameters apart.

Manholes are not to be cut in the centre girder, and the manholes in the side girders are to be shifted well clear of each other transversely, and of the manholes in the inner bottom plating, and also clear of all butts. The manholes in the floor plates, side girders, and inner bottom plating, are to be no larger and not more numerous than necessary to render all parts of the double bottom readily accessible. The edges of the manholes should be fairly smooth to enable them to be entered with facility.

In this system of construction, the bulkheads are to be connected to the inner bottom plating by double angle irons, of the size required for the reversed frames, and to be caulked and made watertight.

CELLULAR DOUBLE BOTTOMS HAVING CONTINUOUS FLOORS FROM CENTRE GIRDER TO MARGIN PLATE.

When double bottoms are constructed with solid floor plates lightened with manholes fitted to every frame and continuous in one length from the middle line to the margin plate, the scantlings are to be as

given in Table G 6, and intercostal plates are to be fitted about midway between the centre girder and margin plate, and well connected to the floors and to the inner and outer bottom plating.

In this system of construction the outside plating (except the garboard strakes and flat keel plates) which is entirely within the boundary of the double bottom, may be reduced as hitherto admitted in double bottoms.

Any other plan of fitting double bottoms may be adopted, provided in the first instance it receives the approval of the Committee.

CEILING.

Section 25. All vessels to be closely ceiled from the main keelson to the upper part of the bilges, the ceiling to be secured in such a manner as to be easily removed. From the upper part of the bilges upwards, either batten and space or close ceiling may be adopted, but the former is considered preferable.

The ceiling on the floors is to be made in hatches where practicable, of convenient sizes, and, when not so arranged, to be fastened to the reversed angle irons or frames in such a manner as to be removed when required for the purpose of survey, or for cleaning and painting.

For thickness of ceiling, *see* Table G 2.

Vessels engaged *exclusively* in the coal trade will not be required to have cargo battens fitted.

ENGINE SPACE.

Section 26. In vessels propelled by machinery, care must be taken that the engine and boiler bearers are properly constructed, having efficient longitudinal ties; and, where the bearers may interfere with the longitudinal strength of the vessel, they must extend a sufficient distance beyond the bulkheads of the engine and boiler space, to compensate for such interruption.

Where it is intended to fit engines of greater power than is done in ordinary cargo carrying steamers, the engine seating should be of proportionately greater strength, and be specially adapted with this object in view by being connected to the sides of the vessel; and other means adopted to ensure greater rigidity and strength to withstand the extra vibration produced in this part of the vessel. The after floor-plates should also be extended well above the screw-shaft, and the after lengths of outside plating attached to the stern-frame, should be of not less thickness than the plates in the same range amidships. More than usual care should be bestowed in ensuring sound riveting and workmanship at this part; and it is recommended that the after frames be sufficiently apart transversely to admit of this being effected.

When the machinery and boilers are fitted, as many *upper*, *middle*, and hold or lower-deck beams of extra strength, having double angle irons at upper and lower edges of the sizes, as per Table G 3, are to be introduced as may be practicable; and the vessel to be otherwise made secure where necessary in the engine-room, to the satisfaction of the Surveyors. *See* page 76, paragraph 7.

In the engine and boiler space, double reverse angle irons must be fitted to every floor, from bilge to bilge; and in vessels where the number for plating is 15,000 and above, or the depth from the hold beams is 15ft. or above, they are to extend sufficiently high to admit of the bilge stringer angle irons being riveted to them, unless the bilges are otherwise additionally strengthened by web-frames. Where the number is 16,000 and under 18,000, not less than three web-frames are to be fitted on each side, formed of plates of not less than the thickness of the frames, and sufficiently broad to receive double angle irons on their inner edge,

passing within the bilge stringer angle irons and to scarph the ends of the floors, and extend to the deck next above the hold beam stringer plate. Where the number is 18,000 and under 30,000, these web-frames are not to be more than from 8 to 10 feet apart, and where the number is 30,000 and above, they are not to exceed 8 feet apart. And the whole of the reverse frames in way of the engine and boiler space, in vessels where the plating number is 18,000 and above, are to extend to the upper deck, or the web-frames should be extended to this height. The web-frames are to be fitted in way of the deck beams when practicable, and if fitted between the beams they are to be connected to the stringer plate by bracket knees above and below the same.

Where it is desired to adopt other plans than the foregoing for maintaining the necessary rigidity in the engine and boiler space, sketches of the same must be submitted for the approval of the Committee.

SHAFT TUNNEL.

The plating of shaft tunnels to be from $\frac{4}{16}$ to $\frac{6}{16}$ of an inch in thickness, in proportion to the size of the vessel: the top plating in way of the hatchways to be not less than $\frac{2}{16}$ of an inch thicker than the remaining plates, or to be covered with wood not less than two inches thick. The tunnel to be additionally strengthened with transverse angle irons not more than four feet apart, of the size of the reversed frames, and the plating to be caulked, and the tunnel to be made water-tight. The tunnel to be fitted with a water-tight sluice door on the engine room bulkhead, capable of being closed from the upper deck.

COCKS, VALVES AND SOIL PIPES.

Section 27. A sluice cock or valve is to be fitted at the limbers, at each water-tight bulkhead, to allow water to be shut off, or to reach the pumps when required; the same to be fitted, so as to be controlled above the load water-line, and to be boxed in, to prevent injury.

The shut-off valves or cocks of all openings for the inlet or outlet of water, in connection with the engines and boilers, are to be fitted close to the vessel's sides, and are to be accessible at all times.

All head and stern pumps to be efficiently provided with stop-cocks, to the satisfaction of the Surveyors.

Where soil pipes are attached to the outside plating below the load water-line, the lower length must be of iron of substantial thickness and be secured to the plating with a proper faced-joint, and extended for some distance above the load water-line.

If the remainder of the pipe be of lead, care must be taken that it be of substantial thickness, and that it be properly protected externally with either zinc or iron, to the satisfaction of the Society's Surveyors.

HATCHWAYS AND MAST PARTNERS.

Section 28. All hatchways are to be properly framed to receive half beams where required, and the mast-holes to have partners at the upper deck and at the tier of beams where the masts are wedged, the plating of which is not to be less in thickness than is required for stringer plates, and the united breadths of the plates are not to be less than twice the diameter of the masts. These plates are to be well riveted to each other, and to the beams; and at the decks, where the masts are to be wedged, an angle iron of the dimensions required for the main frame of the ship is to be properly fitted and riveted to the plate round the mast-holes.

It is recommended to have only one large angle iron on the beams where comings are intended to be fitted

of sufficient size to compensate for double angle irons, the angle iron to be on the side of the beam that will be clear of the hatchway space. Plates are to be fitted and riveted to these beams, where necessary, in order that the ends of the deck may be properly fastened.

Where upper deck hatchways are above twelve feet and not exceeding sixteen feet in length, strong shifting beams are to be fitted with proper means for firmly securing the same. Where the length is above sixteen feet and not exceeding twenty feet, a deep web-plate is to be fitted between double angle irons, at the middle of the length, extending the depth of the coming and carlings; and the fore and aft tie-plates in way of the same, and extending two spaces of beams beyond each end of the hatchway or opening, are to be double the width of that given in Table G 4, or such other arrangement as may be considered equal thereto may be adopted, if approved by the Committee. When the length exceeds twenty feet, a deck plan is to be submitted for the approval of the Committee, showing the necessary additional transverse strength proposed to be applied, by increasing the number of web-plates, and either increasing the width of the stringer and tie-plates, or by plating the beams in way of the same, as the case may require. Where iron decks are fitted, as required by the Rules, additional strength is to be applied around all hatchways of twenty feet and above, either by doubling the plating, or by fitting plates of the breadth and thickness required for tie-plates in Table G 4.

All hatchway comings on weather decks and the companions at the fore end of steamers to be of iron.

In all cases where half beams are required, fore and aft carlings, of the same size and description as the hatchway beams, are to be fitted in the hatchway spaces; the plates forming the comings and head ledges are to be of sufficient strength in proportion to their size, and are to extend to the lower edge of the beams and carlings, and must be riveted to them, excepting that when the beams are of bulb iron they may then terminate on the bulb; where coming plates are of extra thickness, the carlings may be dispensed with. (*See sketches after page* 123.)

Half beams are to be fitted to alternate frames between the hatchway beams, and their ends are to be secured by the angle irons on their upper edges being made knee-shaped, and fitted and riveted to the fore and aft carlings or comings. In addition, fore and aft tie-plates are to be fitted close to the comings and riveted to the beams and half beams. An angle iron with its flange of sufficient depth to extend half an inch above the deck, is to be fitted and riveted to the comings and head-ledge plates, and to the beams and tie-plates; its upper edge to be properly caulked, and the rivets used in its vertical flange to be countersunk and flush-headed.

In vessels having long hatchways for the purpose of "self trimming," wing boards are to be fitted to the approval of the Committee, to prevent the shifting of cargo.

The hatches of steamers to be solid, not less than 2½ inches in thickness.

ENGINE AND BOILER OPENINGS.

Section 29. The engine and boiler openings of the weather deck of steam vessels are to be properly framed for a height of not less than eighteen inches above the deck, the coming plates to extend to the lower edge of the beams, and iron trunk bulkheads connected to the comings should be fitted to a height of about seven feet above the deck; the thickness of the same, where exposed, to be not less than that required for the side plating of poops, and to be efficiently stiffened by vertical angle irons of the size of the reversed frames thirty inches apart, and connected to the coming plates. The thickness of the comings to be

one-sixteenth of an inch more than required for the trunk bulkheads. Where the trunk bulkheads are enclosed by a complete bridge house extending to the sides of the vessel, and efficiently protected from the force of the sea, a reduction from the above thickness might be admitted, provided in such cases a plan showing the proposed arrangement be furnished for approval. (*See sketches after page* 123.)

The engine and boiler openings in the 'tween decks of all vessels are also to be enclosed by trunk bulkheads efficiently stiffened by angle irons and extending to the weather deck beams to which they are to be secured.

Strong iron doors will be allowed in these trunk bulkheads, provided their lower parts are at least eighteen inches above the deck, and efficient arrangements made for their security.

When a poop, bridge house, or awning deck covers the engine and boiler space, the comings of the engine and boiler openings should not be less than two feet above the deck.

It is considered that in all cases the engine and boiler openings should be made as small as practicable, and be subdivided by athwartship iron divisional casings to secure the maximum safety of the vessel. The two sides of the casing should in all instances be efficiently connected by angle iron beams within them at the upper part.

The engine-room skylights are to be in all cases substantially constructed and to be securely bolted or riveted to the comings, and where the skylight top is not solid with bull's eyes fitted in the same, efficient deadlights of iron or wood must be provided.

Where either the engine or boiler opening on the upper deck exceeds twelve feet long, or the combined length exceeds twenty-four feet, the fore and aft tie-plates in way of the openings are to be double the width given in Table G 4, and are to extend two spaces of beams beyond each end of the openings.

Where either of the openings exceeds fifteen feet, or the combined length exceeds thirty feet, the beams in way of the same are to be plated over from the stringer to the tie-plates, the plating extending two beam spaces beyond the openings, and tapered from thence towards the stringer plate for a distance not less than the breadth of the plating required to be fitted; the thickness of this plating to be the same as given in Table G 4 for iron decks.

Where large openings are adjacent to each other, the space between should be plated over wherever practicable.

COAL BUNKER PIPES AND LIDS.

Section 30. Coal bunker pipes, where practicable, are to be formed so as to be at least twelve inches above the upper deck, fitted with lids having studs to fit in openings made in the pipes, for their security; the pipes to be so formed that tarpauling may be securely lashed over them. Where there are coal bunker hatches in the weather deck they must be properly framed with iron comings of suitable height having solid hatches secured by an iron bar or other approved fastening.

PORTS AND SCUPPERS.

Section 31. All vessels must be fitted with a sufficient number of ports and scuppers, to readily discharge any large quantity of water from the upper deck. The ports and flaps, where such are adopted, are to be hung by strong hinges, and the scuppers formed in the vertical flange of the upper deck stringer angle iron, which is to be increased in depth, so as to enclose the scuppers; or any other equally efficient plan may be adopted.

Where the bulwark plating and roughtree rail are cut through to form a cargo port, the bulwark stays at each end of the port should be of increased strength, to the satisfaction of the Surveyors.

A sufficient number of scuppers, with proper pipes attached to them, are to be fitted in all 'tween decks to convey water or leakage to the bilges.

VENTILATORS.

Section 32. It is recommended that ventilators, sufficient in number and size, be efficiently fitted to the upper deck of all vessels.

When scuttles are fitted for ventilation in the topsides of vessels, strong covers for them are to be provided; these covers to be efficiently fitted, to the approval of the Surveyors.

Where scuttles are fitted in the sheerstrake within three-fifths the vessel's length amidships, compensation is to be given either by an extra thickness in the sheerstrake, doubling plate in way of the scuttles, or else by the introduction of strong angle iron over them.

CHAIN PLATES.

Section 33. The chain plates to be in proportion to the size of the vessel, and riveted efficiently to the outside plating (not bulwark plating), the sheerstrake being preferable.

BITTS.

Section 34. All bitts, when not of iron, and which do not go down to the deck below, to be fitted into iron sockets fastened through the deck to plates riveted to the beams.

CEMENT.

Section 35. The frames and plating of the bottom of all vessels to the upper part of the bilges to be thickly and efficiently covered with Portland or other approved cement, which may be mixed with sand or other suitable substance. Ca to be taken to have a proper substance of cement at its termination, and to keep the watercourses clear all fore and aft. The whole to be to the satisfaction of the Surveyors.

RUDDER.

Section 36. The rudder to be made to ship and unship while the vessel is afloat. The size of main piece, given in Table G 2, to be regulated by the number which regulates the thickness of the vessel's plating; it is to be of the best hammered iron. The frame of the rudder and main piece to be one forging; the frame to be properly stayed by wrought-iron stays welded on the frame, and to be carefully plated and riveted. It is recommended that the pintles be made independent of the frame. They should be spaced not more than from 4 feet to 5 feet 6 inches, and the upper one should be placed as near as practicable to the rudder trunk, and the rudder plates should be secured to the frame with snap-headed rivets, or should be otherwise completed to the satisfaction of the Surveyors. All vessels to have a spare tiller and gear ready for use if required.

WINDLASS AND HAWSE-PIPES.

Section 37. The windlass, *for all grades,* if of wood, may be composed of either of the following timbers; namely, English, African, or Live Oak; Adriatic, Italian, Spanish, Portuguese, or French Oak; East India Teak, Morung Saul, Greenheart, Morra, and Iron Bark. The iron spindle in all cases to pass through the body of the windlass.

The hawse-pipes must be of sufficient size and thickness, and the outside flange of proper form to admit of an easy lead for the cable to the windlass, or capstan.

PUMPS.

Section 38. In addition to the engine pumps in steam vessels, an efficient pump is to be fitted in the bilges, on each side of the vessel, to each cargo compartment, capable of being worked from the upper or main deck, or such other arrangement may be adopted as may, when submitted to the Committee for their approval, be deemed satisfactory by them. A doubling plate should be fitted under all sounding pipes.

In the case of new steam vessels plans of the various compartments, showing the intended arrangement of the bilge suction pipes, sluices, and roses connecting the main and donkey engine pumps with these compartments, are to be submitted, in the first instance, for the approval of the Committee.

EQUIPMENT.

Section 39. All vessels are required to have their masts, spars, and rigging in good order, and sails in sufficient number and in good condition.

Every ship is to be provided with anchors, cables, &c., of approved quality, properly tested at a *public machine*, in number and length, as set forth in the Table No. 22, annexed.

In cases, however, where anchors and chain cables are manufactured abroad and supplied to *foreign owned vessels*, and testing certificates are furnished setting forth that the anchors and chain cables have been tested at a Government machine, or a machine under the control of a municipal body, or a similar responsible body, such certificates will be accepted as complying with the requirements of the Rules, for obtaining the figure 1, provided the remaining requirements of Table 22 be complied with, but in these cases the record of A.&C.P. will not be made in the Register Book.

A Certificate of all chains and anchors having been tested, and of the strain applied to them, must be produced before the ship is classed with the figure 1.

The equipment as regards anchors, chains, warps, &c., is to be regulated by the number produced by the sum of the measurements of the half moulded breadth of the vessel amidships, her depth from the upper part of keel to the top of the upper deck beams, and the girth of her half midship section to the same height, multiplied by her length, for a one, two, or three-decked vessel, and for a spar-decked vessel, awning-decked vessel, or a vessel having a continuous shade deck, the measurements of depth and girth are to be taken to the top of the spar, awning, or shade deck beams, as the case may be.

For a steam vessel with a partial awning deck, poop, top-gallant forecastle, *enclosed* bridge-house, or a raised quarter-deck, the equipment number to be increased *one-fifteenth* beyond that which it would be if she were flush-decked, when the united lengths of such erections does not exceed one-fourth the length of the vessel, and when this proportion of the length is exceeded, the equipment number to be increased *one-tenth* beyond that which it would be if she were flush-decked.

All vessels under 150 tons to be provided with one good boat; and every vessel of 150 tons, and above, to have a suitable number. The Surveyors are to be particular in examining and reporting the condition of the boats of all vessels.

In ships navigated by steam, the boilers and machinery are to be considered as part of the equipment, and unless the Surveyors are satisfied of their efficiency, the figure 1 will be withheld, and it is to be understood that, although, for facilities in contracting, a class, to which the hull of a vessel may be found entitled, will be assigned, the class will not be inserted in the Register Book unless the engines and boilers have been surveyed in accordance with the requirements of the Rules.

The efficient state and condition of the whole of the ship's equipment will be designated by the figure 1; and where the same is found insufficient in quantity, or defective in quality, by a dash thus — following the character assigned to the ship.

DEFECTIVE EQUIPMENT.

In the case of a steam vessel already classed of which the engines or boilers are reported to be so far inefficient or defective as to imperil the vessel's safety, an indication to that effect will be made in the Register Book by a red ring being stamped or posted over the figure 1 for equipment, and in the case of vessels about to be built, for which drawings are submitted for the approval of the Committee, and where the engines or boilers are of novel description, or where experience has not sufficiently shown the safety of the principle or mode of application involved, the figure 1 will not be assigned, and the words—"Boiler Experimental," or "Machinery Experimental" will be placed against the class of the vessel, in the Register Book; but where in the opinion of the Committee the machinery or boilers are deemed so far inefficient or defective as to imperil the vessel's safety, the figure 1 will be withheld, and a red ring inserted in place thereof; and, in the case of masts or rigging of a ship which are reported to be so far defective as to imperil the vessel's safety, the indication in the Register Book will be made by a black ring, stamped or posted over the figure 1 for equipment; as described in the foot-note on the page of the Register Book and in the Key thereto.

MACHINERY AND BOILERS OF STEAM SHIPS.

In new vessels propelled by steam, and in vessels fitted with new engines or boilers, the machinery is to be submitted to the inspection of the Society's Engineer-Surveyors, who will furnish a report to the Committee describing them, in the manner and form, No. 8 annexed. The Committee will thereupon, if found satisfactory, grant a certificate, and insert in the Register Book the notification, "L.MC." *in red* (*i.e.*, "LLOYD'S MACHINERY CERTIFICATE"), indicating that the machinery and boilers are certified to be in good order and safe working condition.

In order to facilitate this inspection, the plans of the machinery and boilers are to be examined, and from them the working pressure fixed.

In cases where it is proposed to construct boilers of steel for classed vessels, or vessels intended for classification, the material is required to fulfil the following conditions:—(*See* Circular, No. 438*, page 122.)

1. The material is to have an ultimate tensile strength of not less than 26 and not more than 30 tons per square inch of section,* with an ultimate elongation of not less than 20 per cent. in a length of eight inches. It is to be capable of being bent to a curve of which the inner radius is not greater than one and a half times the thickness of the plates or bars, after having been heated uniformly to a low cherry-red, and quenched in water of 82° Fahrenheit.
2. Steel rivets are to be considered as part of the material, and in addition to being subjected to a shearing test, they must be capable of withstanding the same tests as the plates are required to undergo.

* Steel of a less tensile strength than 26 tons per square inch, if satisfactory in other respects, may be allowed in any case where the scantlings are equal to those prescribed in the Rules for iron boilers. In such cases the Surveyors should represent the facts for the Committee's consideration.

3. Samples for testing are to be selected from each batch of plates submitted for approval, care being taken in the selection that, as far as possible, each cast or furnace charge from which the material has been produced is represented. In addition to these tests, the temper test is to be applied to samples taken from *every* plate intended to be used in the furnaces and combustion chambers of the boilers.
4. All the holes in steel boilers should be drilled, but if they be punched the plates are to be afterwards annealed.
5. All plates that are dished or flanged, or in any way heated in the fire for working, except those that are subjected to a compressive stress only, are to be annealed after the operations are completed.
6. No steel stays are to be welded.
7. Unless otherwise specified, the Rules for the construction of iron boilers will apply equally to boilers made of steel.

The Surveyors will be guided in fixing the working pressure by the tables and formulæ annexed.

Any novelty in the construction of the machinery or boilers to be reported to the Committee.

The boilers, together with the machinery, to be inspected at different stages of construction.

The boilers to be tested by hydraulic pressure, in the presence of the Engineer-Surveyor, to twice the working pressure, and carefully gauged while under test.

Two safety valves to be fitted to each boiler and loaded to the working pressure in the presence of the Surveyor. If common valves are used, their combined areas to be at least half a square inch to each square foot of grate surface. If improved valves are used, they are to be tested under steam in the presence of the Surveyor; the accumulation in no case to exceed 10 per cent. of the working pressure.

An approved safety valve also to be fitted to the super-heater.

In Winch boilers one safety valve will be allowed, provided its area be not less than half a square inch per square foot of grate surface.

Each valve to be arranged so that no extra load can be added when steam is up, and to be fitted with easing gear which must lift the valve itself. All safety-valve spindles to extend through the covers and be fitted with sockets and cross handles, allowing them to be lifted and turned round in their seats, and their efficiency tested at any time.

Stop-valves to be fitted so that each boiler can be worked separately.

Each boiler to be fitted with a separate steam-gauge, to accurately indicate the pressure.

Each boiler to be fitted with a blow-off cock independent of that on the vessel's outside plating.

The machinery and boilers are to be securely fixed to the vessel to the satisfaction of the Surveyor.

Gauges of an approved description for testing the truth of the crank shafts are to be supplied with all new engines, and adjusted in the presence of the Surveyor.

The engines are to be fitted with two feed-pumps, each capable of supplying the boilers; the pumps, &c., to be so arranged that either can be overhauled whilst the other is at work.

The engines are to be fitted with two bilge pumps which are to be so arranged that either can be overhauled whilst the other is at work.

In engines of 70 H.P. and under, one feed-pump and one bilge pump will be deemed sufficient, provided they are of adequate capacity.

A bilge injection, or a bilge suction to the circulating pump is to be fitted.

The engine bilge pumps are to be fitted capable of pumping from each compartment of the vessel (*see* Section 38). The mud boxes and roses in engine room are to be placed where they are easily accessible, and to the satisfaction of the Surveyor.

A donkey pump is to be provided capable of supplying the boilers with water. A donkey is to be so fitted as to pump from each compartment, to deliver water on deck, and if no hand pump is fitted in engine room, it must be fitted to work by hand.

All steam and feed-pipes are to be of copper and of a thickness to the satisfaction of the Surveyor.

All discharge-pipes to be, if possible, carried above the deep load-line, and to have discharge-valves fitted on the plating of the vessel in an accessible position.

No pipes to be carried through the bunkers without being properly protected.

Bilge suction-pipes to be arranged to pump direct from each compartment, the roses to be fixed in places where they can be easily accessible.

COCKS, PIPES, AND SEA CONNECTIONS.

With a view to insuring better control over cocks, valves, and pipes connecting the engines and boilers with the sea, they are to be fixed as follows, in all new vessels and vessels having *new engines or boilers* :—

All sea-cocks to be fitted on the plating of the vessel above the level of the stoke-hold and engine-room platforms, or attached to Kingston valves of a height sufficient to lift them up to the level of these platforms.

The bolts securing all cocks or sea connections to the plating of the vessel are to be tapped into the plating of the vessel or fitted with countersunk heads.

The blow-off cocks on the plating of the vessel are to be fitted with spigots passing through the plating, and a brass or gun metal ring on the outside. The cocks are to be so constructed that the key or spanner can only be taken off when the cock is shut.

Cocks and valves connecting all suction pipes to be fixed above the stoke-hold and engine-room platforms.

The arrangement of pumps, bilge injections, suction and delivery pipes, to be such as will not permit of water being run from the sea into the vessel by an act of carelessness or neglect. Any defective arrangement to be reported to the Committee. (*See* also page 64.)

SPARE GEAR.

The articles of spare gear mentioned in the following list will be required to be carried in all steam vessels classed in the Society's Register Book, viz. :—

2 connecting rod top-end bolts and nuts
2 connecting rod bottom-end bolts and nuts
2 main-bearing bolts
1 set of coupling bolts
1 set of feed and bilge pump valves
1 set of piston springs (where common springs are used)
A quantity of assorted bolts and nuts
Iron of various sizes.

In addition to the foregoing the following articles are recommended to be carried with a view to expedite repairs, and lessen delay in distant ports, viz.:—

Crank shaft
Propeller shaft
Propeller, or a full set of blades
Stern bush, or lignum-vitæ lining for bush
Air pump rod
Circulating pump rod
H. P. valve spindle
L. P. valve spindle
1 set of check valves
1 pair of connecting rod brasses
1 pair of cross head brasses
1 set of link brasses
1 cylinder escape valve and spring
1 eccentric strip complete
6 junk ring bolts
6 cylinder cover bolts
4 valve chest cover bolts
2 dozen boiler tubes
3 dozen condenser tubes
1 set of safety valve springs

REPORTS ON VESSELS.

Section 40. The Surveyors, in submitting their Reports of vessels not already classed, are in all cases, where practicable, to forward a sketch of the midship section, and other drawings where necessary, to be furnished by the builders, with figured dimensions of the component parts marked thereon.

Builders wishing to adopt plans other than those described herein, are to submit them through the Resident Surveyors (who are to state their opinions thereon), for the Committee's consideration and approval.

THREE-DECKED STEAM VESSELS.

Section 41. Steam vessels not less than 15 feet depth of hold to the middle deck, having two or more complete decks laid and caulked, and a tier of hold beams, or extra strong beams, or web frames and stringers in lieu thereof, will have their scantlings determined as follows:—Such vessels to be denoted in the Register Book, "3Dks," or "2Dks3trB.," or "2Dks&web frames," as the case may be.

The scantlings of the frames, reversed frames and floor-plates, the thickness of bulkheads, and diameter of pillars, are determined by the number produced by the deduction of *seven feet* from the sum of the measurements in feet, arising from the addition of the half-moulded breadth of the vessel amidships, the depth from the upper part of the keel to the top of the *upper deck beams*, and the girth of the half midship frame section measured from the centre line at top of keel to the *upper deck stringer* plate.

The scantlings of the keel, stem, sternpost; the thickness of the outside plating, keelson and stringer plates, and deck; also the scantlings of the angle irons on beam stringer plates, and keelson and stringer angle irons in hold, as in Tables G 1, G 2, and G 4, are governed by the number obtained by multiplying that which regulates the size of the frames, &c., by the length of the vessel.

All the frames are to extend to the upper deck stringer plate.

The reversed frames are to extend to the upper part of the middle deck beam stringer angle iron, and to the upper part of the frames alternately.

The plating to be of the thickness given in Table G 1 from the keel to the gunwale; the sheerstrake to be placed at the gunwale, and the strake of plating in way of the middle deck to be an outside strake.

The middle deck stringer plate to be of the breadth and thickness prescribed in Table G 4; it is to be fitted and connected to the outside plating by angle irons between the frames of the size given for beam stringer angle iron, and in addition, an inner stringer angle iron of the same size, passing continuously fore and aft,

must be riveted to reversed angle iron on each frame, and to the stringer plate—the space between this angle iron and the outside plating, all fore and aft, to be filled in and made water-tight. Similar angle irons are to be riveted to the stringer plate, reversed frames, and outside plating, at the lower deck stringer.

Where there would be considerable bevel to the angle iron fitted on the stringer plate and to the reversed frame *aft*, the angle iron may be omitted for one-twelfth of the vessel's length at that end, and flanged plates may be substituted at that part for angle irons for attaching the stringer plates to the outside plating.

A reduction of one-sixteenth of an inch from the thickness required by Table G 4 for the upper deck stringer and tie-plates, will be allowed for those of the middle deck; but their widths must not be less than those of the upper deck.

The butt-straps of the sheerstrake and upper and middle deck stringer plates and of not less than three strakes of plating at the bilge, to be one-sixteenth of an inch thicker than the plates they connect, and treble riveted, for half the vessel's length amidships.

In these vessels, a side intercostal keelson is to be fitted and attached to the outside plating by angle irons of not less size than $3 \times 3 \times \frac{7}{16}$; but if the plating number is 21,700 or above, then these angle irons must not be less than $3\frac{1}{2} \times 3\frac{1}{2} \times \frac{8}{16}$. When a double bottom is fitted, this keelson may be dispensed with in the range thereof.

The thickness of the flat of upper deck is to be as given in Table G 2. In all cases a middle deck is to be properly laid and caulked, the thickness of which may be one-half inch less than that prescribed for the upper deck.

Engine room hatchways on the main deck are to be enclosed by iron trunk bulkheads, efficiently strengthened, and extended from the main deck to the upper deck.

If in such vessels the length exceeds *eleven* times the depth taken from the *upper part of the keel* to the top of the *middle deck beams*, additional strength will be required at the bilge and bottom, as per Section 46; but no additional strength at the sheerstrake and stringer plate will be needed until the length exceeds *eleven* times the depth taken from *the upper part of the keel* to the top of the *upper deck beams;* when this is the case, additional strength will be required in the *upper deck* sheerstrakes, as per Section 46, relating to vessels' proportions.

SPAR-DECKED STEAM VESSELS.

Section 42. Vessels noted in the Register Book as "Spar-deck," are those which are of lighter construction* than vessels built under the Three-decked rule, having the same dimensions, taken with reference to the total depth to the spar or upper deck in either case.

They must have three tiers of beams and be not less than 15 feet depth of hold to the main deck. The Committee, however, will approve of the construction of Spar-deck vessels having a less depth of hold provided the plans be in the first instance submitted for approval. For such vessels, having less than 15 feet depth of hold, a minimum freeboard must also be submitted to the Committee for approval, and the freeboard sanctioned is to be inserted in the Certificate and in the Register Book and marked on the ship's sides.

In cases where erections are required on the spar deck, plans must be submitted showing the additional strengthening proposed, which must be to the satisfaction of the Committee.

* This does not necessarily imply that the vessel is of less strength in relation to the amount of deadweight carried at a suitable load line.

In such vessels the scantlings and arrangements are to be regulated by the dimensions under the main or middle deck, as in those having one or two decks.*

All the frames must extend to the spar-deck stringer plate.

The reversed angle irons on the frames are to extend to the upper part of the main or middle-deck beam stringer angle iron, and to the upper part of the frames, alternately.

When the plating number is under 13,100, the plating from the main to the spar-deck sheerstrake must not be less than six-sixteenths of an inch in thickness; if 13,100 and under 16,600, it must not be less than seven-sixteenths of an inch in thickness; and if 16,600 and under 30,900 it must not be less than eight-sixteenths of an inch; and if 30,900 or above, it must not be less than nine-sixteenths of an inch in thickness.

A reduction of two-sixteenths of an inch from the thickness required by Table G 1 for the main-deck sheerstrakes, and from that given in the upper line of Table G 4 for stringer and tie-plates, will be allowed for those of the spar deck.

The butt-straps of the spar and main-deck sheerstrakes and stringer plates, and of not less than three strakes of plating at the bilges, to be one-sixteenth of an inch thicker than the plates they connect, and treble riveted for half the vessel's length amidships.

In these vessels, a side intercostal keelson is to be fitted, and attached to the outside plating by angle irons of not less than $3 \times 3 \times \frac{7}{16}$; but if the plating number is 21,700 or above, then these angle irons must not be less than $3\frac{1}{2} \times 3\frac{1}{2} \times \frac{8}{16}$. When a double bottom is fitted, this keelson may be dispensed with in the range thereof.

The lower edge of the main sheerstrake must not be more than one-half its depth below the main-deck stringer plate.

The main-deck stringer plate is to be fitted and connected to the sheerstrake by angle irons between the frames, of the size given for beam stringer angle iron, and in addition, an inner stringer angle iron of the same size, passing continuously fore and aft, must be riveted to reversed angle iron on each frame, and to the stringer plate; the space between this angle iron and the sheerstrake, all fore and aft, to be filled in and made water-tight. Similar angle irons are to be riveted to the stringer plate, reversed frames, and outside plating at the lower deck.

Where there would be considerable bevel to the angle iron fitted on the stringer plate, and to the reversed frame *aft*, the angle iron may be omitted for one-twelfth of the vessel's length at that end, and flanged plates may be substituted at that part for angle iron for attaching the stringer plate to the outside plating.

These vessels are to have a complete main or middle deck $3\frac{1}{2}$ inches in thickness, properly laid and caulked; and a main or middle-deck sheerstrake of the thickness prescribed by Table G 1.

The flat of spar deck to be not less than $3\frac{1}{2}$ inches in thickness.

Engine-room hatchways on the main deck are to be enclosed by iron trunk bulkheads, efficiently strengthened and extended from the main deck to the spar deck.

The measurement of depth, for regulating the additional strength required for vessels of extreme proportions given in Section 46, is to be taken from the upper part of keel to the top of the *main or middle-deck beams.*

* Where the height between the main and spar decks is eight feet or above at any part, additional transverse strength will be required to the satisfaction of the Committee.

When Section 46 (relating to vessels' proportions) applies to these vessels, the increased strength defined for sheerstrakes is to be added to those of either the spar or main deck.

They are to have extra strength at their bilges in the proportion of their length to depth from main deck as prescribed in Section 46 ; they may, however, be 12 and under 13 depths in length before they are required to have the remaining extra strength prescribed for vessels of 11 to 12 depths in length, and such vessels exceeding the above proportions to have extra strength in the same relation to that prescribed for one and two-decked vessels.

Vessels to which this rule applies, as regards an entire spar deck, will be noted in the Register Book thus :—"*Spar dk.*"

AWNING-DECKED VESSELS. (*See* N.B. at foot.)

Section 43. An awning-decked vessel is one having a comparatively light superstructure fore and aft on the main deck proper of the vessel, intended to shelter passengers, or cattle, or for the conveyance of cargo, either light in its nature or limited in quantity. In such vessels the scantlings and arrangements of the frames, reversed frames, the thickness of bulkheads, and diameter of pillars in Table G 1, are to be regulated by the dimensions under the main deck, as in a one or two-decked vessel, exclusive of the awning deck.

The plans of such vessels and a minimum freeboard must be submitted to the Committee for approval, and the freeboard thus sanctioned is to be inserted in the Certificate and in the Register Book, and marked on the ship's sides.*

Awning-decked vessels loading to a greater draught of water than thus indicated will thereby lose their character in the Register Book.

Vessels to which this rule applies, as regards an entire awning deck, will be noted in the Register Book thus, "*Awng dk.*"

Such erections only as are necessary for navigating these vessels will be allowed on the awning deck, unless plans are submitted to, and approved by, the Committee.

All the main frames must extend to the awning-deck stringer plate, or to the lower part of the curve when of a rounded form at the gunwale. To be of the size given in Table G 1, but in no case to be less than $3 \times 3 \times \frac{6}{16}$.

The whole of the reversed frames are to be extended to the top of the main-deck stringer angle iron.

All the side plating above the main sheerstrake in vessels whose number is under 13,100 to be not less than five-sixteenths of an inch in thickness; if of that number, and under 18,700, to be not less than six-sixteenths; if of that number or above, to be not less than seven-sixteenths of an inch in thickness.

The awning-deck stringer plate to be of the breadth given in Table G 4 for hold beam stringers, and to be not less than six-sixteenths of an inch in thickness where the plating number is under 14,000, and seven-

N.B.—It is a condition on which an awning-decked vessel is classed in the Society's Register Book that the freeboard assigned shall be marked on the vessel's sides as above prescribed; and, under the provisions of Section 43 *of the Society's Rules for Iron Ships, if the vessel be loaded to a greater draught of water than that assigned by the Committee, or if the mark indicating the maximum load draught be placed higher than the position assigned by the Committee, the vessel will thereby forfeit her Character in the Register Book.*

* See Circular, No. 354, p. 162 of Rules.

sixteenths where the plating number is 140,00 or above. Where the number for plating exceeds 30,900, or the vessel exceeds thirteen depths in length to the main deck, special arrangements must be made for affording the requisite longitudinal strength at the gunwale, to the satisfaction of the Committee.

The tie-plates to be of the same thickness as given above for the stringer plates, and to be in breadth as in Table G 4 for main deck tie-plates.

The butts of the awning-deck side plating above the main deck, and of the awning-deck stringer and tie-plates, are to be double riveted.

A reduction of one-fourth from the thickness prescribed for the main deck will be allowed for the flat of awning deck.

The beams to be of the sizes given in Table G 3. They are to be placed at every alternate frame, and if the vessel is of a rounded form at the gunwale, to scarph the main frames not less than eighteen inches, and to be properly riveted to them.

Engine-room hatchways on the main deck are to be enclosed by iron trunk bulkheads, efficiently strengthened and extended from the main deck to the awning deck; and the comings to the engine-room skylight not to be less than two feet above the awning deck.

Rounded gunwale plating to be not less in thickness than required for the awning-deck stringer plate, and to have a gunwale angle iron of the size required by Table G 2.

The gunwale must be properly constructed to the satisfaction of the Surveyors.

The main-deck stringer plate is to be fitted and connected to the sheerstrake by angle iron between the frames, of the size given for beam stringer angle iron; and, in addition, an inner stringer angle iron of the same size, passing continuously fore and aft, must be riveted to reversed angle iron on each frame, and to the stringer plate; the space between this angle iron and the sheerstrake, all fore and aft, to be filled in and made water-tight.

POOPS, FORECASTLES, AND BRIDGE HOUSES.

Section 44. In full poops, forecastles, and engine space enclosures, a reduction of one-fourth from the dimensions which would be required in the same range, if the vessel were flush-decked, (exclusive of additions for extreme proportions) will be allowed in the outside plating, stringer and tie-plates upon beams, angle iron on stringer plates, and flat of deck. In no case need the side plating exceed six-sixteenths of an inch in thickness, and it must not be less than five-sixteenths.

All frames to extend to the poop or forecastle stringer plate, or to the lower part of the curve when of a rounded form at the gunwale. The beams to be of the size given in Table G 3, and they are to be efficiently pillared. A beam to be placed at every alternate frame to scarph the main frames not less than eighteen inches, and to be properly riveted to them.

The rounded gunwale plating may be of the thickness required for the poop or forecastle stringer plates. The gunwale must be properly constructed to the satisfaction of the Surveyors.

Poop and bridge-house bulkheads to be of the thickness of their side plating, and to be efficiently stiffened with angle irons and bracket knees, to the satisfaction of the Surveyors.

If the poop does not extend beyond one-fourth the vessel's length from aft, tie-plates need not be fitted on their beams.

Where the poop exceeds one-fourth of the vessel's length, the upper deck stringer plate and sheerstrake are to be either increased in thickness or doubled, in way of the break, for a length of from twenty to thirty feet, or increased strength at this part may be obtained in any other way, if to the satisfaction of the Surveyors.

In top-gallant forecastles of vessels whose plating number is 18,000 and above, the alternate reversed frames are to extend to the forecastle deck, or a double angle iron stringer of the size required for reversed frames is to be fitted inside the frames midway between the upper and forecastle decks, connected at the fore end by an efficient breasthook; or other equally efficient means of strengthening the forecastle may be adopted, if approved by the Committee.

Where it is proposed to fit a poop or top-gallant forecastle to a vessel under 14 feet depth of hold, the plans are to be submitted for the consideration of the Committee.

Where bridge-houses are fitted, the whole of the frames are to be extended to the height of the bridge-deck, or be connected to the stringer plates by knees and bracket plates, and the gunwale angle iron made continuous. Where efficient partial bulkheads are fitted, the alternate frames only need extend to the height of the bridge deck.

Where the combined length of the poop, or raised quarter deck, and enclosed bridge-house, exceeds two-fifths the vessel's length, and the plating number is 15,000 and above, the sheerstrake should be doubled for one-half the vessel's length amidships, or other equivalent strength should be added, to the satisfaction of the Committee.

RAISED QUARTER-DECKS.

Section 45. Side plating of raised quarter-decks may be one-sixteenth of an inch less in thickness than topside plating below it, if the topside plating be seven-sixteenths of an inch in thickness or more.

The frames in all cases, and the reversed angle irons on alternate frames, are to extend to the raised quarter-deck stringer plate.

The upper deck beam stringer plate is to maintain its breadth to the break of the quarter-deck, and then it may be gradually reduced in breadth until it terminates at the fourth frame abaft the break, and it is to be fitted and riveted to the outside plating. The upper deck sheerstrake is to extend to the stern. The front or break bulkhead of the raised quarter-deck is to be stiffened by a thwartship plate, of not less size than the upper deck beam tie-plates, and efficiently connected to it by angle iron; this thwartship plate is to receive the deck ends, and is to be supported by bracket plates, when not riveted to a beam.

Where the raised deck is less than one quarter of the vessel's length, a reduction of one-fifth from the thickness which would be required in the same range if the vessel were flush decked will be allowed in the stringer and tie-plates upon beams, and angle iron on stringer plates and the flat of the deck, but no such reduction is to be made where the length of the raised quarter-deck exceeds the above limits.

Where the raised deck exceeds one quarter of the vessel's length, the number and arrangement of the hold beams, beam stringers and stringers in hold, must be in accordance with the Rules for the increased depth of the vessel, and the height of the reversed angle irons on the frames is to be regulated by the number for scantlings which the increased depth would give. The main sheerstrake should be doubled, or increased in

thickness, for a reasonable distance before and abaft the break; the side plating of the raised deck should be increased in thickness at the break, and be extended for some distance before the break; the butts of this plating, the main sheerstrake, and the strake of plating next below must be treble riveted in the neighbourhood of the break, and the butt-straps be one-sixteenth of an inch thicker than the plates they connect. The main deck stringer plate should extend abaft the break about seven frame spaces, and the raised deck stringer plate about four frame spaces before the break, and the stringer plates below the main deck should have a shift of about sixteen feet overlap, or the necessary strength may be obtained by other arrangements if approved by the Surveyors. *The size of beams of raised quarter-decks to be regulated as prescribed in Table* G 3.

Where an iron deck is required to be fitted by the rules, and is severed at the break, its continuity of strength is to be maintained by efficient brackets securely attached to the break bulkhead and to the iron deck before and abaft the same, or otherwise arranged to the satisfaction of the Surveyors.

Where the combined length of the poop, or raised quarter-deck, and enclosed bridge-house, exceeds two-fifths the vessel's length, and the plating number is 15,000 and above, the sheerstrake should be doubled for one-half the vessel's length amidships, or other equivalent strength should be added, to the satisfaction of the Committee.

VESSELS OF EXTREME PROPORTIONS.

Section 46. In the following cases additional longitudinal strength, beyond that stated in the foregoing Rules, and in Tables G 1 and G 2, will be required. For stringer plates and iron decks, *see* Table G 4.

The length, breadth, and depth to be taken as per Section 1.

In all cases where keelsons, or other additions, are required for a certain portion of the length of a vessel, care should be taken to avoid any abrupt termination of this additional strength, by tapering the keelsons, &c., beyond these limits, and properly shifting their terminations.

VESSELS ABOVE 11 AND NOT EXCEEDING 12 DEPTHS IN LENGTH.

Plating Number under 18,700. The sheerstrake to be increased one-sixteenth of an inch in thickness for three-fourths the vessel's length amidships.

To have a bulb plate of the dimensions required for the midship beam plate, placed between, and riveted to, the double angle iron bilge keelson for one-half the vessel's length amidships.

To have one strake of plating at the bilges one-sixteenth of an inch thicker than prescribed in Table G 1, for one-half the vessel's length amidships.

Plating No. 18,700 and under 26,000. The sheerstrake to be increased two-sixteenths of an inch in thickness for three-fourths the vessel's length amidships.

To have a bulb plate of the dimensions of the midship beam plate, placed between, and riveted to, the double angle iron bilge keelson for three-fifths the vessel's length amidships.

And to have two strakes of plating at the bilge one-sixteenth of an inch thicker than given in Table G 1, for one-half the vessel's length amidships.

Plating No. 26,000 and under 35,000. The sheerstrake to be increased two-sixteenths of an inch in thickness for three-fourths the vessel's length amidships, and the strake below increased one-sixteenth of an inch for half the vessel's length amidships.

To have a bulb plate of the dimensions required for the midship beam plate, placed between, and riveted to, the double angle iron bilge keelson for three-fifths the vessel's length amidships.

To have also a bulb plate of the same size as the above, fitted to the side intercostal keelson for one-half the vessel's length amidships.

To have an intercostal bilge keelson fitted for half the vessel's length amidships, and attached to the outside plating. And to have intercostal plates riveted between the upper bilge stringer angle irons, and attached to the outside plating for half the length of the vessel amidships.

Plating No. 35,000 and under 40,000. The sheerstrake to be increased two-sixteenths of an inch in thickness for three-fourths the vessel's length amidships, and the strake below it one-sixteenth of an inch for half the length amidships.

To have a continuous plate keelson standing on the floors and attached to the side intercostal keelson plates, having double angle irons on its upper and lower edges, of the size given in Table G 2 for keelson angle irons. The continuous plate keelson to be, in depth, sufficient to take the deep flanges of the double angle irons on top and bottom, and to be the same thickness as that given in Table G 2 for middle line keelsons, and to extend for one half the vessel's length amidships.

To have an intercostal bilge keelson fitted for half the vessel's length amidships, and attached to the outside plating. To have a bulb plate of the size required for the midship beam plate fitted to the bilge keelson for three-fifths the vessel's length amidships.

And to have intercostal plates fitted between the upper bilge stringer angle irons, and attached to the outside plating for three-fifths the vessel's length amidships.

VESSELS ABOVE 12 AND NOT EXCEEDING 13 DEPTHS IN LENGTH.

Plating No. under 18,700. The sheerstrake to be increased in thickness two-sixteenths of an inch, for three-fourths the vessel's length amidships.

To have a bulb plate of the dimensions required for the midship beam plate, placed between, and riveted to, the double angle iron bilge keelson for three-fifths the vessel's length amidships.

To have two strakes of plating at the bilges one-sixteenth of an inch thicker than prescribed in Table G 1, for one-half the vessel's length amidships.

Plating No. 18,700 and under 26,000. The sheerstrake to be increased two-sixteenths of an inch in thickness for three-fourths the vessel's length amidships, and the strake below it one-sixteenth of an inch for half the length amidships.

To have a bulb plate of the dimensions required for the midship beam plate, placed between, and riveted to, the double angle iron bilge keelson for three-fifths the vessel's length amidships.

And to have intercostal plates riveted between the upper bilge stringer angle irons, and attached to the outside plating for one-half the vessel's length amidships; or to have in lieu thereof three strakes of plating at the bilge one-sixteenth of an inch thicker than required by Table G 1 for the same length.

Plating No. 26,000 and under 35,000. The sheerstrake and the strake below it to be increased two-sixteenths of an inch in thickness for three-fourths and one-half the vessel's length amidships respectively, and the upper deck stringer plate to be increased one-sixteenth of an inch in thickness for three-fifths the vessel's length amidships.

To have a bulb plate of the dimensions required for the midship beam plate fitted to the side intercostal keelson for one-half the vessel's length amidships.

VESSELS OF EXTREME PROPORTIONS.

Section 46. In the following cases additional longitudinal strength, beyond that stated in the foregoing Rules, and in Tables G 1 and G 2, will be required. For stringer plates and iron decks, *see* Table G 4.

The length, breadth, and depth to be taken as per Section 1.

In all cases where keelsons, or other additions, are required for a certain portion of the length of a vessel, care should be taken to avoid any abrupt termination of this additional strength, by tapering the keelsons, &c., beyond these limits, and properly shifting their terminations.

VESSELS ABOVE 11 AND NOT EXCEEDING 12 DEPTHS IN LENGTH.

Plating Number under 18,700. The sheerstrake to be increased one-sixteenth of an inch in thickness for three-fourths the vessel's length amidships.

To have a bulb plate of the dimensions required for the midship beam plate, placed between, and riveted to, the double angle iron bilge keelson for one-half the vessel's length amidships.

To have one strake of plating at the bilges one-sixteenth of an inch thicker than prescribed in Table G 1, for one-half the vessel's length amidships.

Plating No. 18,700 and under 26,000. The sheerstrake to be increased two-sixteenths of an inch in thickness for three-fourths the vessel's length amidships.

To have a bulb plate of the dimensions of the midship beam plate, placed between, and riveted to, the double angle iron bilge keelson for three-fifths the vessel's length amidships.

And to have two strakes of plating at the bilge one-sixteenth of an inch thicker than given in Table G 1, for one-half the vessel's length amidships.

Plating No. 26,000 and under 35,000. The sheerstrake to be increased two-sixteenths of an inch in thickness for three-fourths the vessel's length amidships, and the strake below increased one-sixteenth of an inch for half the vessel's length amidships.

To have a bulb plate of the dimensions required for the midship beam plate, placed between, and riveted to, the double angle iron bilge keelson for three-fifths the vessel's length amidships.

To have also a bulb plate of the same size as the above, fitted to the side intercostal keelson for one-half the vessel's length amidships.

To have an intercostal bilge keelson fitted for half the vessel's length amidships, and attached to the outside plating. And to have intercostal plates riveted between the upper bilge stringer angle irons, and attached to the outside plating for half the length of the vessel amidships.

Plating No. 35,000 and under 40,000. The sheerstrake to be increased two-sixteenths of an inch in thickness for three-fourths the vessel's length amidships, and the strake below it one-sixteenth of an inch for half the length amidships.

To have a continuous plate keelson standing on the floors and attached to the side intercostal keelson plates, having double angle irons on its upper and lower edges, of the size given in Table G 2 for keelson angle irons. The continuous plate keelson to be, in depth, sufficient to take the deep flanges of the double angle irons on top and bottom, and to be the same thickness as that given in Table G 2 for middle line keelsons, and to extend for one half the vessel's length amidships.

To have an intercostal bilge keelson fitted for half the vessel's length amidships, and attached to the outside plating. To have a bulb plate of the size required for the midship beam plate fitted to the bilge keelson for three-fifths the vessel's length amidships.

And to have intercostal plates fitted between the upper bilge stringer angle irons, and attached to the outside plating for three-fifths the vessel's length amidships.

VESSELS ABOVE 12 AND NOT EXCEEDING 13 DEPTHS IN LENGTH.

Plating No. under 18,700. The sheerstrake to be increased in thickness two-sixteenths of an inch, for three-fourths the vessel's length amidships.

To have a bulb plate of the dimensions required for the midship beam plate, placed between, and riveted to, the double angle iron bilge keelson for three-fifths the vessel's length amidships.

To have two strakes of plating at the bilges one-sixteenth of an inch thicker than prescribed in Table G 1, for one-half the vessel's length amidships.

Plating No. 18,700 and under 26,000. The sheerstrake to be increased two-sixteenths of an inch in thickness for three-fourths the vessel's length amidships, and the strake below it one-sixteenth of an inch for half the length amidships.

To have a bulb plate of the dimensions required for the midship beam plate, placed between, and riveted to, the double angle iron bilge keelson for three-fifths the vessel's length amidships.

And to have intercostal plates riveted between the upper bilge stringer angle irons, and attached to the outside plating for one-half the vessel's length amidships; or to have in lieu thereof three strakes of plating at the bilge one-sixteenth of an inch thicker than required by Table G 1 for the same length.

Plating No. 26,000 and under 35,000. The sheerstrake and the strake below it to be increased two-sixteenths of an inch in thickness for three-fourths and one-half the vessel's length amidships respectively, and the upper deck stringer plate to be increased one-sixteenth of an inch in thickness for three-fifths the vessel's length amidships.

To have a bulb plate of the dimensions required for the midship beam plate fitted to the side intercostal keelson for one-half the vessel's length amidships.

VESSELS OF EXTREME PROPORTIONS.

Section 46. In the following cases additional longitudinal strength, beyond that stated in the foregoing Rules, and in Tables G 1 and G 2, will be required. For stringer plates and iron decks, *see* Table G 4.

The length, breadth, and depth to be taken as per Section 1.

In all cases where keelsons, or other additions, are required for a certain portion of the length of a vessel, care should be taken to avoid any abrupt termination of this additional strength, by tapering the keelsons, &c., beyond these limits, and properly shifting their terminations.

VESSELS ABOVE 11 AND NOT EXCEEDING 12 DEPTHS IN LENGTH.

Plating Number under 18,700. The sheerstrake to be increased one-sixteenth of an inch in thickness for three-fourths the vessel's length amidships.

To have a bulb plate of the dimensions required for the midship beam plate, placed between, and riveted to, the double angle iron bilge keelson for one-half the vessel's length amidships.

To have one strake of plating at the bilges one-sixteenth of an inch thicker than prescribed in Table G 1, for one-half the vessel's length amidships.

Plating No. 18,700 and under 26,000. The sheerstrake to be increased two-sixteenths of an inch in thickness for three-fourths the vessel's length amidships.

To have a bulb plate of the dimensions of the midship beam plate, placed between, and riveted to, the double angle iron bilge keelson for three-fifths the vessel's length amidships.

And to have two strakes of plating at the bilge one-sixteenth of an inch thicker than given in Table G 1, for one-half the vessel's length amidships.

Plating No. 26,000 and under 35,000. The sheerstrake to be increased two-sixteenths of an inch in thickness for three-fourths the vessel's length amidships, and the strake below increased one-sixteenth of an inch for half the vessel's length amidships.

To have a bulb plate of the dimensions required for the midship beam plate, placed between, and riveted to, the double angle iron bilge keelson for three-fifths the vessel's length amidships.

To have also a bulb plate of the same size as the above, fitted to the side intercostal keelson for one-half the vessel's length amidships.

To have an intercostal bilge keelson fitted for half the vessel's length amidships, and attached to the outside plating. And to have intercostal plates riveted between the upper bilge stringer angle irons, and attached to the outside plating for half the length of the vessel amidships.

Plating No. 35,000 and under 40,000. The sheerstrake to be increased two-sixteenths of an inch in thickness for three-fourths the vessel's length amidships, and the strake below it one-sixteenth of an inch for half the length amidships.

To have a continuous plate keelson standing on the floors and attached to the side intercostal keelson plates, having double angle irons on its upper and lower edges, of the size given in Table G 2 for keelson angle irons. The continuous plate keelson to be, in depth, sufficient to take the deep flanges of the double angle irons on top and bottom, and to be the same thickness as that given in Table G 2 for middle line keelsons, and to extend for one half the vessel's length amidships.

To have an intercostal bilge keelson fitted for half the vessel's length amidships, and attached to the outside plating. To have a bulb plate of the size required for the midship beam plate fitted to the bilge keelson for three-fifths the vessel's length amidships.

And to have intercostal plates fitted between the upper bilge stringer angle irons, and attached to the outside plating for three-fifths the vessel's length amidships.

VESSELS ABOVE 12 AND NOT EXCEEDING 13 DEPTHS IN LENGTH.

Plating No. under 18,700. The sheerstrake to be increased in thickness two-sixteenths of an inch, for three-fourths the vessel's length amidships.

To have a bulb plate of the dimensions required for the midship beam plate, placed between, and riveted to, the double angle iron bilge keelson for three-fifths the vessel's length amidships.

To have two strakes of plating at the bilges one-sixteenth of an inch thicker than prescribed in Table G 1, for one-half the vessel's length amidships.

Plating No. 18,700 and under 26,000. The sheerstrake to be increased two-sixteenths of an inch in thickness for three-fourths the vessel's length amidships, and the strake below it one-sixteenth of an inch for half the length amidships.

To have a bulb plate of the dimensions required for the midship beam plate, placed between, and riveted to, the double angle iron bilge keelson for three-fifths the vessel's length amidships.

And to have intercostal plates riveted between the upper bilge stringer angle irons, and attached to the outside plating for one-half the vessel's length amidships; or to have in lieu thereof three strakes of plating at the bilge one-sixteenth of an inch thicker than required by Table G 1 for the same length.

Plating No. 26,000 and under 35,000. The sheerstrake and the strake below it to be increased two-sixteenths of an inch in thickness for three-fourths and one-half the vessel's length amidships respectively, and the upper deck stringer plate to be increased one-sixteenth of an inch in thickness for three-fifths the vessel's length amidships.

To have a bulb plate of the dimensions required for the midship beam plate fitted to the side intercostal keelson for one-half the vessel's length amidships.

Also to have a bulb plate of the same size as the above, placed between, and riveted to, the double angle iron bilge keelson for three-fifths the vessel's length amidships. To have an intercostal bilge keelson fitted for half the vessel's length amidships and attached to the outside plating.

And to have intercostal plates riveted between the upper bilge stringer angle irons and attached to the outside plating for one-half the vessel's length amidships.

Plating No. 35,000 and under 40,000. The sheerstrake to be doubled below the stringer plate with plates not less than 20 inches broad, in long lengths and of the thickness of the topside plating, for three-fourths the vessel's length amidships, and the upper deck stringer increased two-sixteenths of an inch in thickness for half the length amidships.

To have a continuous plate keelson standing on the floors and attached to the side intercostal keelson plates, having double angle irons on its upper and lower edges, of the size given in Table G 2 for keelson angle irons. The continuous plate keelson to be, in depth, sufficient to take the deep flanges of the double angle irons on top and bottom, and to be the same thickness as that given in Table G 2 for middle line keelsons, and to extend for one-half the vessel's length amidships.

To have intercostal plates fitted and attached to the outside plating at the bilge keelson for one-half the vessel's length amidships, and to have a bulb plate of the same size as that given above, attached thereto, and to the keelson angle irons, for three-fifths the vessel's length amidships.

To have intercostal plates riveted between the upper bilge stringer angle irons, and attached to the outside plating for three-fifths the vessel's length amidships.

VESSELS ABOVE 13 AND NOT EXCEEDING 14 DEPTHS IN LENGTH.

Plating No. under 10,450. The sheerstrake to be increased two-sixteenths of an inch in thickness for three-fourths the vessel's length amidships, and the strake next below it to be increased one-sixteenth of an inch for one-half the vessel's length amidships.

To have a bulb plate of the dimensions required for the midship beam plate, placed between and riveted to, the double angle iron bilge keelson for three-fifths the vessel's length amidships.

To have also an additional bulb plate of the same size as the above, fitted between the upper bilge stringer angle irons for one-half the length of the vessel amidships.

To have in all cases a side keelson formed of double angle irons, about midway between the bilge and middle line keelson.

And to have two strakes of plating at the bilges one-sixteenth of an inch thicker than prescribed in Table G 1 for one-half the vessel's length amidships.

Plating No. 10,450 and under 15,500. The sheerstrake to be doubled below the stringer plate with plates not less than 18 inches broad in long lengths, and of the thickness of topside plating, for three-fifths of the vessel's length amidships.*

* When it is required to double the sheerstrake for a portion of its breadth, the topside strake may in lieu thereof be doubled its whole breadth for the same length.

To have a bulb plate of the dimensions required for the midship beam plate, placed between and riveted to, the double angle iron bilge keelson for three-fifths the vessel's length amidships.

Where hold beams are not fitted, there is to be an additional bulb plate of the same size as the above fitted between the upper bilge stringer angle irons for one-half the length of the vessel amidships.

To have also a side intercostal keelson fitted between double side keelson angle irons, and attached to the outside plating, extending as far forward and aft as practicable.

In addition to the above, two strakes of plating at the bilges are to be one-sixteenth of an inch thicker than given in Table G 1, for one-half the vessel's length amidships.

Plating No. 15,500 and under 18,700. The sheerstrake to be doubled below the stringer plate with plates not less than 20 inches broad, in long lengths, and of the thickness of the topside plating, for three-fifths the vessel's length amidships.

To have a bulb plate of the dimensions required for the midship beam plate fitted to the bilge keelson for three-fifths the vessel's length amidships.

And to have intercostal plates riveted between the upper bilge stringer angle irons, and attached to the outside plating for one-half the vessel's length amidships; or in lieu thereof three strakes of plating at the bilge are to be increased one-sixteenth of an inch in thickness beyond that required by Table G 1, for the same length.

Plating No. 18,700 and under 26,000. The sheerstrake to be doubled below the stringer plate with plating not less than 20 inches broad, in long lengths, and of the thickness of the topside plating, for three-fifths the vessel's length amidships, and the upper deck stringer plate to be increased one-sixteenth of an inch in thickness for one-half the vessel's length amidships.

To have a bulb plate of the dimensions required for the midship beam plate fitted to the bilge keelson for three-fifths of the vessel's length amidships.

And to have intercostal plates riveted between the upper bilge stringer angle irons and attached to the outside plating for one-half the vessel's length amidships.

Plating No. 26,000 and under 35,000. The sheerstrake to be doubled below the stringer plate with plates not less than 20 inches broad, in long lengths, and of the thickness of the topside plating, for three-fourths the vessel's length amidships, and the stringer plates increased two-sixteenths of an inch for three-fifths the vessel's length amidships.

To have a bulb plate of the dimensions required for the midship beam plate fitted to the side intercostal keelson for one-half the vessel's length amidships.

To have a bulb plate of the size required for the midship beam plate fitted to the bilge keelson for three-fifths the vessel's length amidships.

To have intercostal plates fitted and riveted between the bilge keelson angle irons and attached to the outside plating for half the vessel's length amidships.

To have intercostal plates riveted between the upper bilge stringer angle irons and attached to the outside plating for three-fifths the vessel's length amidships.

And the middle line keelson in these vessels to be one-fourth deeper than required by Table G 2 for half the length amidships, tapered forward and aft to the depth given in the Table.

Plating No. 35,000 and under 40,000. The sheerstrake to be doubled its whole depth as far as practicable for three-fourths the vessel's length amidships, the next strake below it increased two-sixteenths of an inch in thickness for half the vessel's length, and the upper deck stringer plate increased two-sixteenths of an inch for three-fifths the vessel's length amidships.

To have a continuous plate keelson standing on the floors and attached to the side intercostal keelson plates, having double angle irons on its upper and lower edges, of the size given in Table G 2 for keelson angle irons. The continuous plate keelson to be three-fourths the depth given in Table G 2 for middle line keelsons, and the same thickness, and to extend for one-half the vessel's length amidships.

To have an intercostal bilge keelson attached to the outside plating for half the vessel's length amidships; and to have a bulb plate of the same size as that given above attached thereto, and to the keelson angle irons, for three-fifths the vessel's length amidships.

To have intercostal plates fitted between the upper bilge stringer angle irons and attached to the outside plating for three-fifths the vessel's length amidships.

The middle line keelson in these vessels to be one-fourth deeper than required by Table G 2 for one-half the vessel's length amidships, tapered forward and aft to the depth given in the Table.

VESSELS ABOVE 14 AND NOT EXCEEDING 15 DEPTHS IN LENGTH.

Plating No. under 10,450. The sheerstrake to be doubled its breadth below the stringer plate, with plates not less than eighteen inches broad and of the thickness of the strake next below it, for three-fourths the vessel's length amidships.

To have a bulb plate of the dimensions required for the midship beam plate fitted to the bilge keelson for three-fifths the vessel's length amidships.

To have a bulb plate of the same size as the above fitted between the upper bilge stringer angle irons for one-half the vessel's length amidships.

To have in all cases a side keelson formed of double angle irons, about midway between the bilge and middle line keelson, with a bulb plate between of the size given above.

And to have an intercostal stringer fitted at the upper turn of bilge and attached to the outside plating for half the vessel's length amidships, or in lieu thereof one strake of plating at the bilge, doubled for the same length.

Plating No. 10,450 and under 15,500. The sheerstrake to be doubled its breadth below the stringer plate, with plates not less than twenty inches broad and of the thickness of the strake next below it, for three-fourths the vessel's length amidships.

To have a bulb plate of the dimensions required for the midship beam plate, fitted to the bilge keelson for three-fifths of the vessel's length amidships.

To have a side intercostal keelson attached to the outside plating extending as far forward and aft as practicable.

And to have intercostal plates fitted between the upper bilge stringer angle irons and attached to the outside plating for one-half the vessel's length amidships; or in lieu thereof to have one strake of plating at the bilge doubled for one-half the vessel's length amidships.

Plating No. 15,500 and under 18,700. The sheerstrake to be doubled its breadth below the stringer plate, with plates not less than twenty-four inches broad and of the thickness of the strake next below it, for three-fourths the length of the vessel amidships.

To have a bulb plate of the dimensions required for the midship beam plate fitted to the bilge keelson for three-fifths the vessel's length amidships.

To have intercostal plates riveted between the upper bilge stringer angle irons and attached to the outside plating for one-half the vessel's length amidships; or in lieu thereof one strake of plating at the bilge to be doubled for the same length.

Plating No. 18,700 and under 26,000. The sheerstrake to be doubled its breadth below the stringer plate, with plates not less than twenty-four inches broad and of the thickness of the strake next below it, for three-fourths the vessel's length amidships, and the upper deck stringer plate increased two-sixteenths of an inch in thickness for one-half the vessel's length amidships.

To have a bulb plate of the dimensions required for the midship beam plate, fitted to the bilge keelson for two-thirds of the vessel's length amidships.

Also to have a bulb plate, of the same size as the above, fitted to the side intercostal keelson for one-half the vessel's length amidships.

To have intercostal plates riveted between the upper bilge stringer angle irons and attached to the outside plating for one-half the vessel's length amidships.

And the middle line keelson in these vessels to be one-fourth deeper than required by Table G 2 for half the length amidships, tapered forward and aft to the depth given in the Table.

Plating No. 26,000 and under 35,000. The sheerstrake to be doubled its breadth below the stringer plate, with plates not less than twenty-four inches broad and of the thickness of the strake next below it, for three-fourths the vessel's length amidships; the strake next below it to be increased two-sixteenths of an inch for half the length, and the upper deck stringer plate to be increased two-sixteenths of an inch for three-fifths the vessel's length amidships.

To have a continuous plate keelson standing on the floors, and attached to the side intercostal keelson plates, having double angle irons on its upper and lower edges of the size given in Table G 2 for keelson angle irons. The continuous plate keelson to be in depth sufficient to take the deep flanges of the double

angle irons on top and bottom, and to be the same thickness as that given in Table G 2 for middle line keelsons, and to extend for one-half the vessel's length amidships.

To have an intercostal plate fitted and riveted between the bilge keelson angle irons, and attached to the outside plating for three-fifths the vessel's length amidships, with a bulb plate, of the size given above, attached thereto, and extending two-thirds the length of the vessel amidships.

To have an intercostal plate riveted between the upper bilge stringer angle irons and attached to the outside plating for three-fifths the vessel's length amidships.

The middle line keelson to be one-fourth deeper than required by Table G 2, for one-half the vessel's length amidships, tapered forward and aft to the depth given in the Table.

Plating No. 35,000 and under 40,000. The sheerstrake and the strake below it to be doubled their whole breadth, with plates of the thickness of the topside plating for three-fourths and one-half the vessel's length amidships, and the upper deck stringer plate doubled for a breadth of forty-two inches for three-fifths the vessel's length amidships,

To have a continuous plate keelson standing on the floors and attached to the side intercostal keelson plates, having double angle irons on its upper and lower edges, of the size given in Table G 2 for keelson angle irons. The continuous plate keelson to be three-fourths the depth given in Table G 2 for middle line keelsons, and the same thickness, and to extend for one-half the vessel's length amidships.

To have an intercostal bilge keelson attached to the outside plating for three-fifths the vessel's length amidships, with a continuous plate keelson standing on the floors, and attached to the intercostal plates, having double angle irons on its upper and lower edges, of the size given in Table G 2 for keelson angle irons. The continuous plate keelson to be in depth sufficient to take the double angle irons on top and bottom, and to be the same thickness as that given in Table G 2 for middle line keelsons, and to extend for one-half the vessel's length amidships.

To have intercostal plates fitted between the upper bilge stringer angle irons and attached to the outside plating for three-fifths the vessel's length amidships.

The middle line keelson in these vessels to be one-fourth deeper than required by Table G 2 for half the length amidships, tapered forward and aft to the depth given in the Table.

VESSELS ABOVE 15 AND NOT EXCEEDING 16 DEPTHS IN LENGTH.

Plating No. under 15,500. The sheerstrake to be doubled its breadth below the stringer plate, with plates not less than twenty inches broad and of the thickness of the strake next below it, for three-fourths of the vessel's length amidships.

To have a bulb plate of the dimensions required for the midship beam plate, fitted to the bilge keelson for three-fifths the vessel's length amidships.

To have a side intercostal keelson attached to the outside plating, extending as far forward and aft as practicable.

To have intercostal plates fitted between the upper bilge stringer angle irons, and attached to the outside plating for one-half the vessel's length amidships, or in lieu thereof to have one strake of bilge plating doubled for one-half the length amidships.

Plating No. 15,500 and under 18,700. The sheerstrake to be doubled its breadth below the stringer plate, with plates not less than twenty-four inches broad and of the thickness of the strake next below it, for three-fourths the length of the vessel amidships.

To have, in addition to the side intercostal keelson, intercostal plates fitted between the bilge keelson angle irons and attached to the outside plating for three-fifths the vessel's length amidships.

To have also intercostal plates riveted between the upper bilge stringer angle irons, and attached to the outside plating for one-half the vessel's length amidships; or in lieu thereof one strake of plating at the bilge, to be doubled for the same length.

Plating No. 18,700 and under 26,000. The sheerstrake to be doubled its whole breadth with plates of the thickness of the topside plating, for three-fourths the vessel's length amidships, and the upper deck stringer plate increased two-sixteenths of an inch in thickness for one-half the vessel's length amidships.

To have a bulb plate of the dimensions required for the midship beam plate fitted to the side intercostal keelson for one-half the vessel's length amidships.

To have intercostal plates fitted and riveted between the bilge keelson angle irons, and attached to the outside plating for half the vessel's length amidships, with a bulb plate of the size given above attached thereto, and extending three-fifths the length of the vessel amidships.

To have intercostal plates riveted between the upper bilge stringer angle irons and attached to the outside plating for three-fifths the vessel's length amidships.

The middle line keelson to be one-fourth deeper than required by Table G 2 for half the vessel's length amidships, tapered forward and aft to the depth given in the Table.

Plating No. 26,000 and under 35,000. The sheerstrake to be doubled its whole breadth with plates of the thickness of the topside plating for three-fourths the vessel's length amidships; and the strake of plating next below it doubled its whole breadth with plates of the same thickness for three-fifths the length amidships, and the upper deck stringer plate doubled for a breadth of forty inches with plates of its own thickness for half the vessel's length amidships.

To have a continuous plate keelson standing on the floors, and attached to the side intercostal keelson plates, having double angle irons on its upper and lower edges, of the size given in Table G 2 for keelson angle irons. The continuous plate keelson to be three-fourths the depth given in Table G 2 for middle line keelsons, and the same thickness, and to extend for one-half the vessel's length amidships.

To have an intercostal bilge keelson attached to the outside plating for three-fifths the vessel's length amidships, with a bulb plate of the size given above attached thereto for two-thirds the vessel's length amidships.

To have intercostal plates fitted between the upper bilge stringer angle irons and attached to the outside plating for three-fifths the vessel's length amidships.

The middle line keelson to be one-fourth deeper than required by Table G 2, for half the vessel's length amidships, tapered forward and aft to the depth given in the Table.

Plating No. 35,000 and under 40,000.* The sheerstrake and two strakes below it to be doubled with plates of the thickness of the topside plating for three-fourths, three-fifths, and one-half the vessel's length amidships respectively; and the upper deck stringer plate to be doubled a breadth of fifty inches with plates of its own thickness for three-fifths the vessel's length amidships.

To have a continuous plate keelson standing on the floors and attached to the side intercostal keelson plates, having double angle irons on its upper and lower edges, of the size given in Table G 2 for keelson angle irons. The continuous plate keelson to be three-fourths the depth given in Table G 2 for middle line keelsons, and the same thickness, and to extend for one-half the vessel's length amidships.

To have an intercostal bilge keelson attached to the outside plating for three-fifths the vessel's length, with a continuous plate keelson standing on the floors and attached to the intercostal, having double angle irons on its upper and lower edges, of the size given in Table G 2 for keelson angle irons. The continuous plate keelson to be three-fourths the depth and the same thickness as given in Table G 2 for middle line keelsons, and to extend for one-half the vessel's length amidships.

To have intercostal plates fitted between the upper bilge stringer angle irons and attached to the outside plating for three-fifths the vessel's length amidships.

The middle line keelson in these vessels to be one-fourth deeper than required by Table G 2, for half the vessel's length amidships, tapered forward and aft to the depth given on the Table.

For all VESSELS EXCEEDING SIXTEEN DEPTHS IN LENGTH to the Middle Deck, and Vessels the Plating No. of which is above 30,000 and which exceed thirteen depths in length to the Upper Deck, plans must be submitted for the approval of the Committee for giving the Vessel sufficient additional strength longitudinally.

VESSELS NOT BUILT UNDER SURVEY.

Section 47. In cases of vessels not surveyed while building, for which a character may be required, application must be made to the Committee in writing, who will direct a special examination to be made by two Surveyors of the Society (one of whom shall be an exclusive officer), for which purpose the vessel is to be placed on high blocks in a dry dock or on ways; the hold to be cleared and proper stages made; the rivets and

* All vessels, excepting those with an awning deck, whose plating number exceeds 35,000 and exceeding 16 depths in length taken from the main deck, are to have the whole of the reverse frames extended to the gunwale for half the vessel's length amidships, or a sufficient number of partial bulkheads fitted in the 'tween decks to the approval of the Committee. In the case of awning-decked vessels they are all to extend to the main deck.

plating of keel, and flat of bottom, thoroughly examined; the close ceiling in the hold to be removed where deemed necessary, and coal bunkers of steam vessels to be cleared; the whole of the frames, stringers, hooks, floor-plates, keelsons, engine and boiler bearers, ends of beams, water-tight bulkheads, rivets, and inner surface of the plating exposed to view;* all oxidation to be removed by being cut or beaten off the several parts above named, also from the outside plating, rivets, keel, stem, sternpost, and rudder; and the planksheers and waterways, if of wood, to be scraped bright. When the vessel is so prepared, the Surveyors are to ascertain by drilling the thickness of the plating in such parts as they may deem necessary, also the condition of all the parts of iron above named, and of the planksheers, waterways, flat of decks, and their fastenings; and send a detailed report thereon, stating the dimensions and quality of the materials and workmanship, to the Committee, who will then assign the vessel such character as the facts may appear to them to warrant.

In addition to the above, the Special Surveys Nos. 1, 2, and 3 described on pages 62 and 114 of the Rules must be complied with, regulated by the age of the vessel, as in the case of vessels built under survey, and the periodical surveys are also to be held as in the case of vessels built under survey.

* In cases where the inner surface of the bottom plating is coated with cement or asphalte, if the coating be carefully inspected, and tested by beating or chipping, and found sound and adhering satisfactorily to the iron, its removal may be dispensed with, provided that upon the removal of a portion, the plating, frames, and rivets under it be found in satisfactory condition.

IRON SHIPS

CLASSED UNDER REGULATIONS PREVIOUSLY PASSED FOR THE BUILDING AND CLASSIFICATION OF IRON SHIPS.

All vessels will be classed ⩓ so long as on careful annual and periodical *special* surveys they are found to be in a fit and efficient condition to carry dry and perishable cargoes to and from all parts of the world. (*See* N.B. at foot.)

Differences of construction, as regards thickness of plating, strength, and probable durability, &c., will be indicated by the letters A, B, and C placed inside the letter ⩓,—thus, ⩓ ⩓ ⩓.

⩓ ⩓ will denote that the vessels have been built in accordance with, or equal to, the Rules and Table G.

⩓ will denote vessels which are considered entitled to the ⩓ character, but which have not been built in accordance with the Rules.

All vessels to be subject to occasional or annual survey when practicable.

To entitle Ships to retain their respective characters in the Register Book, the following Special Surveys must be held periodically :—

Survey No. 1.—The vessel to be placed on blocks of sufficient height in a dry dock, or on ways; the limber boards, and ceiling equal to one strake fore and aft on each side removed, with both surfaces of outside plating exposed.*

In steam vessels the engines and boilers must be examined and favourably reported on by the Society's Engineer-Surveyors. For periodical Surveys of engines and boilers, *see* page 64.

In all vessels the masts, spars, and general equipment must be in good and efficient condition.

If the vessel has a double bottom, all loose ceiling must be removed therefrom, and the tanks be tested by a head of water to the height of the light water-line to test their efficiency.

Survey No. 2.—The vessel to be placed on blocks of sufficient height in a dry dock, or on ways; the limber boards, and ceiling equal to *three* strakes fore and aft on each side removed, with both surfaces of outside plating exposed.*

The windlass at this and all subsequent alternate special surveys to be unhung where necessary, and its wood linings sufficiently stripped, for examination. The chain cables are also to be ranged for inspection.

In Steam Vessels the engines and boilers must be examined and favourably reported on by the Society's Engineer-Surveyors. (*See* page 64.)

In all vessels the masts, spars, and general equipment must be in good and efficient condition.

If the vessel has a double bottom, all loose ceiling must be removed therefrom, and the tanks be tested by a head of water to the height of the light water-line to test their efficiency.

* In cases where the inner surface of the bottom plating is coated with cement or asphalte, if a sufficient quantity of ceiling be removed to enable the coating to be carefully inspected and tested by beating or chipping, and the coating be found sound and good and adhering satisfactorily to the iron, the removal of such coating will be dispensed with. Ships which have undergone the above examination will be noted in the Register Book thus, *s.s.No.*1–79, *s.s.No.*2–79, *s.s.No.*3–79; and if not submitted to such Survey, will be liable to have their character suspended.

N.B.—In reference to the Rules above quoted, and in order to prevent the disappointment arising from ships losing their characters from want of survey, it is hereby intimated that the duty of giving NOTICE OF PERIODICAL SURVEYS *required by the Rules, or when repairs are necessary in consequence of damage, or from other causes, rests with the Owners, Masters, or Agents.*

After a vessel has passed No. 3 Survey, in addition to the survey prescribed for No. 2 when that survey becomes due, ceiling should be lifted at other parts of the vessel where deemed necessary by the Surveyors to enable them to satisfy themselves as to the condition of the inside of the vessel.

Survey No. 3,—BY TWO SURVEYORS, ONE TO BE AN EXCLUSIVE OFFICER OF THE SOCIETY.—The vessel to be placed on blocks of sufficient height, in a dry dock, or upon ways; proper stages to be made, and the hold to be cleared, all the close ceiling in the hold to be removed, so that the rivets and plates of keel and flat of bottom may be thoroughly examined; coal bunkers of steam vessels to be cleared, the whole of the frames, stringers, hooks, floor-plates, keelsons, engine and boiler bearers,* ends of beams, water-tight bulkheads, rivets, and inner surface of the plating, to be exposed;† all oxidation to be removed by being cut or beaten off the several parts above named, also from the outside plating, rivets, keel, stem, stern-post, and rudder; so as to completely lay bare all the surfaces of iron; the planksheers and waterways, if of wood, to be scraped bright. When the vessel is thus prepared, the Surveyors, if they deem necessary, are to ascertain the thickness of the plating by having holes drilled.

Such parts as may be found defective, or less than three-fourths of the required substance by Rule, are to be removed, and replaced with proper materials, equal in substance and quality to the original construction. The planksheers, waterways, flat of decks, and their fastenings, are also to be examined, and made good where necessary.

In steam vessels the engines and boilers must be examined and favourably reported on by the Society's Engineer-Surveyors. (*See* page 64.)

In all vessels the masts, spars and general equipment must be in good and efficient condition.

If the vessel has a double bottom, all loose ceiling must be removed therefrom, and the tanks be tested by a head of water to the height of the light water-line to test their efficiency.

Whenever the bottom plating is to be cemented, a survey is to be held prior to the cement being laid.

Every ship classed ⩓ or ⩓ must be submitted to a *special periodical survey* every *four* years:—the first Survey according to No. 1; the second according to No. 2; the third according to No. 3; and afterwards according to Nos. 1, 2, and 3 consecutively at intervals of four years.

Every ship classed ⩓ must be submitted to a special periodical survey every *three* years, as per Nos. 1, 2, and 3, afterwards Nos. 1, 2, and 3 consecutively.

In all vessels classed ⩓ and above, No. 3 Survey must be complied with before the expiration of thirteen years from the date of build, or the previous No. 3 Survey. In all vessels classed ⩓, No. 3 Survey must be complied with before the expiration of ten years from the date of build, or the previous No. 3 Survey.

* Whenever the engines and boilers are taken out for repair, the engine and boiler bearers, with the floor-plates, keelsons, rivets, &c., under them may, at the request of the owners, be surveyed in anticipation of the above Rule.

† In cases where the inner surface of the bottom plating is coated with cement or asphalte, if a sufficient quantity of ceiling be removed to enable the coating to be carefully inspected and tested by beating or chipping, and the coating be found sound and good and adhering satisfactorily to the iron, the removal of such coating will be dispensed with. Ships which have undergone the above examination will be noted in the Register Book thus, *s.s.No.*1-79, *s.s.No.*2-79, *s.s.No.*3-79; and if not submitted to such Survey, will be liable to have their character suspended.

RULES FOR THE SURVEY OF IRON SHIPS CLASSED FOR PERIODS OF YEARS.

All vessels thus classed to be subject to occasional or annual Survey when practicable, *and every third year to be specially surveyed* in dry dock or laid on blocks, with both surfaces of outside plating exposed;* and whenever the engines or the boilers of iron steam ships are taken out, the vessel shall be submitted to a particular and special Survey.

In steam vessels the engines and boilers must be examined and favourably reported on by the Society's Engineer-Surveyors. (*See* page 64.)

CONTINUATION OF IRON SHIPS TO THE CHARACTER A.

If, on the termination of the period of original designation, or if at any subsequent period, not exceeding one-half the number of years assigned originally, or on Restoration, an Owner shall wish to have his ship remain or be replaced on the letter A, he is to send a written notice thereof to the Secretary, and the Committee shall then direct a special Survey, as follows, to be held by not less than two competent persons, to be appointed by the Committee, one of them to be a Surveyor the exclusive servant of the Society.

SURVEY.

The vessel to be placed on high blocks, in a dry dock, or upon ways, and proper stages to be made, so that the rivets and plates of keel, and flat of bottom, may be thoroughly examined; the whole of the ceiling of lining inside to be entirely removed; coal bunker of steam vessels to be cleared, so as to expose the whole of the frames, stringers, hooks, floor-plates, keelsons, engine and boiler bearers, ends of beams, water-tight bulk-heads, rivets, and inner surface of the plating, to view; the hold to be cleared; all oxidation to be removed by being cut or beaten off the several parts above named, also from the outside plating, rivets, keel, stem, sternpost, and rudder, so as to completely lay bare all the surfaces of iron;* the planksheers and waterways, if of wood, to be scraped bright; and when the vessel is thus prepared, the Surveyors are to ascertain the thickness of the plating by having, if they deem necessary, holes drilled therein, also the condition of all the parts of iron above-named, and of the planksheers, waterways, flat of decks and their fastenings; and upon the Owner consenting to remove and replace with proper materials, equal in substance and quality to the original construction, such parts as may be found defective, or less than three-fourths of the required substance by Rule, such vessel, upon the repairs and efficiency being reported to the Committee, may be continued on the letter A for a term of years not exceeding one-half the number of years assigned originally, or on Restoration, subject to occasional or annual survey when practicable. The period of Continuation will, upon all occasions, commence from the time the ship may have gone off the letter A, without regard to the date when the survey for this purpose may be held. (*See* Special Survey No. 3, as regards examination of windlass, chain cables, double bottoms, machinery of steam ships, &c.)

* In cases where the inner surface of the bottom plating is coated with cement or asphalte, if a sufficient quantity of ceiling be removed to enable the coating to be carefully inspected and tested by beating or chipping, and the coating be found sound and good and adhering satisfactorily to the iron, the removal of such coating will be dispensed with. Ships which have undergone the above examination will be noted in the Register Book, thus *t.s.* ; and if not submitted to such Triennial Survey, will be liable to have their character suspended.

RESTORATION OF IRON SHIPS TO THE CHARACTER ⩓.

If, *at any age of a vessel*, an Owner be desirous to have his ship restored, such Restoration, on his application to the Committee, and consenting to the special survey hereinafter described, to be held by two Surveyors, one of whom shall be an exclusive servant of the Society, and performing the repairs thereby found requisite, will be granted for a period not exceeding two-thirds of the time originally assigned, the same to be calculated from the date of such repairs.

SURVEY AND REQUISITES FOR RESTORATION.

The vessel to be placed on high blocks, in a dry dock, or upon ways, and proper stages to be made, so that the rivets and plates of keel, and flat of bottom, may be thoroughly examined; the whole of the ceiling or lining inside to be entirely removed; coal bunkers of steam vessels to be cleared, the boilers to be taken out and also the engines (unless it shall be shown by previous survey that the removal is unnecessary), so as to expose the whole of the frames, stringers, hooks, floor-plates, keelsons, engine and boiler bearers, ends of beams, water-tight bulkheads, rivets, and inner surface of the plating, to view; the hold to be cleared; all oxidation to be removed by being cut or beaten off the several parts above-named, also from the outside plating, rivets, keel, stem, sternpost, and rudder, so as to completely lay bare all the surfaces of iron;* the planksheers and waterways, if of wood, to be entirely removed, and also the flat of upper deck, except under special circumstances, to be sanctioned by the Committee in each case; and when the vessel is thus prepared, the Surveyors are to ascertain the thickness of the plating by having, if they deem necessary, holes drilled therein, also the condition of all the parts of iron above-named, and of the beams and their fastenings; and upon the Owner consenting to remove such parts as may be found defective, or objected to, or less in thickness than hereinafter admitted for repairing such vessel, and replace them with proper materials equal in quality and substance to that required in the Table G for the nine years' grade in those originally classed 12 ⩓, and equal in quality and substance to that required in the Table G for the six years' grade in vessels originally classed 9 ⩓ or 6 ⩓, such vessel, upon the repairs and efficiency being reported to the Committee, may be restored to the letter ⩓, for a term of years not exceeding two-thirds the number of years assigned originally, subject to occasional survey.

Iron ships which have been Restored under the foregoing Rule shall be entitled to Continuation thereon, subject to the same conditions of survey and examination as are prescribed for ships proposed to be Continued at the expiration of the period first assigned to them; but, in like manner, the term of such extended continuance to be limited to a period not exceeding one-half the number of years for which the ships may respectively have been restored, without reference to the period originally assigned to them. (*See* Special Survey No. 3, for examination of windlass, chain cables, double bottoms, machinery of steam ships, &c.)

* In cases where the inner surface of the bottom plating is coated with cement or asphalte, if a sufficient quantity of ceiling be removed to enable the coating to be carefully inspected and tested by beating or chipping, and the coating be found sound and good and adhering satisfactorily to the iron, the removal of such coating will be dispensed with.

IRON SHIPS ALREADY CLASSED A1.

Iron ships built prior to the promulgation of the Rules will be allowed to remain in the Register Book classed A1 from year to year, *subject to annual survey*, until the expiration of Six Years from their date of build, and then be examined to determine the period to which they may be entitled under the Rules; and if, on such examination, it shall be found the ships are entitled to the 9 or 12 years' grade, it will be in the option of the Owners either to adopt such periods respectively, or continue the vessel A1 from year to year, as above, until the expiration of the extended period; but if it shall be found that the term of years for which a vessel would have been entitled to remain on the A character has expired, she will be classed Æ, if entitled thereto, unless specially surveyed for Continuation or for Restoration.

By order of the Committee,

BERNARD WAYMOUTH,

Secretary.

No. 2, WHITE LION COURT, CORNHILL, LONDON,

1*st July*, 1883.

For Ships built of Steel see page 120.

No. 264.

LLOYD'S REGISTER OF BRITISH AND FOREIGN SHIPPING.

RULES AND REGULATIONS.

IRON SHIPS.

With reference to notice No. 248, announcing the Committee's Resolution of the 6th January, to allow in the case of Iron Ships (not being Spar-decked Ships) built in conformity with the Rules in other respects for the ⩓ Class, a *reduction of one-sixteenth of an inch* in the thickness of outside plating for all parts from that heretofore prescribed in Table G attached to the Rules, and that Iron Ships which had been built upon the Rules hitherto in force, and classed ⩓, should be distinguished in the Register Book by an asterisk prefixed, thus *⩓.

NOTICE is hereby given that in pursuance of a Resolution passed by the Committee this day, Ships only which may be built in conformity with the Rules for the ⩓ character in force prior to the 6th January, 1870, will be allowed that character, and will have an asterisk prefixed, thus *⩓. All other Iron Ships will be classed in accordance with the New Rules 100 ⩓, 90 ⩓, 80 ⩓, or their intermediates.

The foregoing Resolution will apply to all Iron Ships built or contracted for after this date.

By order of the Committee,

GEORGE B. SEYFANG,

Secretary.

No. 2, White Lion Court, Cornhill, London, E.C.
28th April, 1870.

NOTICE, No. 436*.

LLOYD'S REGISTER OF BRITISH AND FOREIGN SHIPPING.

SHIPS BUILT OF STEEL.

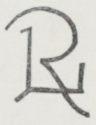
NOTICE is hereby given, that the Committee of this Society have this day passed the following Resolutions, amending Notice No. 392 in regard to the classing of ships built of steel :—

1. In all cases where it is proposed to build ships of steel for classification in the Register Book, a sketch of midship section with longitudinal and other plans showing the details of the scantlings and arrangements, must in the first place be submitted for the approval of the Committee, and the vessel, so approved, must be built under special survey.

2. A general maximum reduction of 20 per cent. in the thickness of the plating, frames, &c., of ships built of steel from that prescribed in Tables G 1, G 2, G 3, and G 4, for iron ships of the 90A grade or above will be allowed, subject to such modifications as may be deemed necessary by the Committee, according to the size of the vessel, when the plans, &c., are submitted for their approval.*

3. The steel to be used in ships building for classification in the Register Book will be required to withstand the whole of the following tests, to be applied at the steel works under the personal inspection of the Society's Surveyors, to samples selected by them from every charge or cast employed in the manufacture of the material, and these samples, when marked by them for testing, should be followed by the Surveyors through the different stages of preparation until the tests are completed.

4. The Committee will require that every plate, beam, and angle supplied for these ships shall be clearly and distinctly stamped by the manufacturer in two places, where the brand cannot be conveniently sheared off, after they have been tested, the brand to be similar to the following, thus :—denoting that a shearing from the plate or angle so marked has successfully been bent cold after being tempered as described in the temper test which follows, and that the plate or angle in question is capable of withstanding the whole of the tests hereafter described; and the Committee will require the Surveyors when in constant attendance at the steel works to satisfy themselves, so far as may be practicable, that these conditions are being complied with in a *bona fide* manner.†



5. Should the samples selected by the Surveyor not fulfil the test requirements, the plates or angles from which they were cut are to be rejected, and further tests are to be made before any material from the same charge can be accepted.

6. When one of the Society's Surveyors is not in constant attendance at the steel works for the purpose of seeing the material tested, the Committee will require that tensile and temper tests shall be applied either at the steel works or at the ship-yard to not less than one plate, angle bar, or bulb plate, in every

* The rivets, keel, stem, sternpost, rudder and pillars, the girders and top of double bottoms, fitted on ordinary floors, coal bunker bulkheads, casings round engines, hatchway comings, poops, forecastles, and deck erections may be of iron of the usual size, but no other parts of such ships are to be of iron without the special sanction of the Committee. When other parts are admitted of iron, the same will be denoted in the Register Book.

† As required in iron ships, all plates, beams, and angles to be legibly stamped in two places with the manufacturer's name or trade-mark, and the place where made, which is also to be stated in the report of survey.

No. 436* (*continued*).

batch of 50, or a batch of less number; but the Surveyor is not to select samples for testing until the material has been tested, stamped, and appropriated by the manufacturer. The samples when marked by the Surveyor for testing are to be followed by him when practicable through the different stages of preparation until the tests are completed. Should the samples tested not fulfil the test requirements, the whole of the material from the charge which produced the samples which fail to withstand the tests prescribed, is to be rejected, or re-tested, and further tests are to be applied to a sample from each of the other charges of which the batch is composed. In the event of any of these samples also failing, the whole of the material from the same charge or charges is to be rejected, as in the first instance.

Before these sample tests have been applied to a batch of steel submitted for check testing, the Surveyor is to be furnished with a certificate by the manufacturer to the effect that the Society's requirements as to the testing of steel have been complied with in the case of the batch in question.

7. In the event of material failing, in any case, to withstand the prescribed tests, the brands approved by the Committee and stamped on the plates, beams, and angles by the manufacturer are to be defaced by punch marks extending beyond the brand in the form of a cross, thus:—denoting that the material is rejected.

8. The Society's Surveyor will require to have every facility placed in his way for tracing all plates, beams, and angles, to their respective charges, and to be furnished with two copies of the advice notes of the material, one of which, when he shall have been satisfied with the results of the tests applied to the material, he is to sign, to be forwarded by the manufacturers to the shipbuilders, and the other of which is to be retained by himself.

TESTS.

Strips cut lengthwise or crosswise of the plate, and also angle and bulb steel, to have an ultimate tensile strength of not less than 27, and not exceeding 31 tons per square inch of section,* with an elongation equal to at least 16 per cent. on a length of 8 inches before fracture.

Strips cut from the plate, angle or bulb steel to be heated to a low cherry-red, and cooled in water of 82° Fahrenheit, must stand bending double round a curve of which the diameter is not more than three times the thickness of the plates tested.

In addition to this, occasional angle bars should be subjected to a cold test by having pieces cut off and bent flat and then doubled backwards.

RIVETS.

The steel used for rivets to be of special quality, soft and ductile, and samples of the rivets should be tested by being bent both hot and cold, by flattening down the heads, and by occasional forge tests, in order to satisfy the Surveyors of their thorough efficiency.

* Steel angles intended for the framing of vessels, and bulb steel for beams, may have a maximum tensile strength of 33 tons per square inch of section, provided they be capable of withstanding the bending tests, and of being efficiently welded.

No. 436* (*continued*).

MEM.—No reduction will be allowed in the sizes of rivets from those which would be required by the Rules for the vessels if built of iron.

In other respects the Rules for the construction of iron ships will apply equally to ships built of steel.

By order of the Committee,

BERNARD WAYMOUTH,

Secretary.

No. 2, White Lion Court, Cornhill, London, E.C.

19*th May*, 1881.

In all Steel Vessels of 300 *feet long and under* 350 *feet, the whole of the butt-straps must be treble riveted for half the Vessel's length amidships, and this is to be extended to three-quarters the length of the vessel amidships where the vessel is* 350 *feet long and above, the butt-straps in each instance to be one-eighth of an inch thicker than the plates they connect.*

No. 2, White Lion Court, Cornhill, London, E.C.

3*rd June*, 1880.

LLOYD'S REGISTER OF BRITISH AND FOREIGN SHIPPING.

NOTICE, No. 438*.

BOILERS MADE OF STEEL.

NOTICE is hereby given, that the Committee of this Society have this day passed the following resolutions amending Notice No. 397 in regard to boilers made of steel:—

1. The use of steel will be sanctioned in the construction of boilers intended for vessels classed or proposed for classification in the Society's Register Book, provided the boilers be constructed in accordance with the requirements of the Rules, and the following conditions be fulfilled.

2. The material is to have an ultimate tensile strength of not less than 26 and not more than 30 tons per square inch of section,* with an ultimate elongation of not less than 20 per cent. in a length of eight inches. It is to be capable of being bent to a curve of which the inner radius is not greater than one and a half times the thickness of the plates or bars, after having been heated uniformly to a low cherry-red and quenched in water of 82° Fahrenheit.

Steel rivets are to be considered as part of the material, and in addition to being subjected to a shearing test, they must be capable of withstanding the same tests as the plates are required to undergo.

* Steel of a less tensile strength than 26 tons per square inch, if satisfactory in other respects, may be allowed in any case where the scantlings are equal to those prescribed in the Rules for iron boilers. In such cases the Surveyors should represent the facts for the Committee's consideration.

No. 438* (*continued*).

3. Samples for testing are to be selected from each batch of plates submitted for approval, care being taken in the selection that, as far as possible, each cast or furnace charge from which the material has been produced is represented.† In addition to these tests, the temper test is to be applied to samples taken from *every* plate intended to be used in the furnaces and combustion chambers of the boilers.

4. The Society's Surveyor will attend at the steel works when necessary, and select the samples for testing before the plates are sheared to size, and these samples when marked by him for testing should, as far as practicable, be followed by the Surveyor through the different stages of preparation until the tests are completed.

5. The Society's Surveyor will require to have every facility placed in his way for tracing all plates to their respective charges, and to be furnished with two copies of the advice notes of the material, one of which, when he shall have been satisfied with the results of the tests applied to the material, is to be signed and forwarded to the boiler manufacturer, and the other is to be retained by himself.

6. The samples are taken for testing in order that the general quality of the material may be ascertained, and if any sample should fail to fulfil the conditions laid down, the plate from which the sample is taken must be rejected; and further tests should be made before any material, made from the same cast or charge as the failing sample, can be approved.

7. All the holes in steel boilers should be drilled, but if they be punched the plates are to be afterwards annealed.

8. All plates that are dished or flanged, or in any way heated in the fire for working, except those that are subjected to a compressive stress only, are to be annealed after the operations are completed.

9. No steel stays are to be welded.

10. Unless otherwise specified, the Rules for the construction of iron boilers will apply equally to boilers made of steel.

By order of the Committee,

BERNARD WAYMOUTH,

Secretary.

No. 2, White Lion Court, Cornhill, London, E.C.

19*th May*, 1881.

† When a great number of charges are represented in the number of plates submitted, a proportion of one tensile and one temper test to every ten plates will be deemed sufficient, provided they all prove to be satisfactory.

IRON VESSELS.

TABLE G. 1.

TABLE OF MINIMUM DIMENSIONS OF KEELS, STEMS, STERN POSTS, FRAMES, REVERSED FRAMES, FLOOR PLATES, BULKHEADS, OUTSIDE PLATING, PILLARS, &c.

NUMBERS. For Frames, Reversed Frames, Bulkheads, and Pillars.	SPACING OF FRAMES.	FRAMES FOR ALL GRADES. Dimensions of angle iron for three-fifths the length of vessel amidships, and bulkheads.	FRAMES FOR ALL GRADES. Dimensions of angle iron before and abaft the three-fifths length.	Dimensions of angle iron for Reversed frames for all grades.	Bulkheads.	Diameter of solid pillars to beams. Hold.	Diameter of solid pillars to beams. Deck.	NUMBERS. For Keel, Stem, Sternpost, and Plating.	KEEL. FOR ALL GRADES.	Stem of Sailing vessels and Steamers, and Sternpost of Sailing vessels and Paddle Steamers.	Stern-frame of Screw Steamers.	THICKNESS OF OUTSIDE PLATING FOR HALF-LENGTH AMIDSHIPS. Garboard Strakes. 100A	Garboard Strakes. 90A AND 80A	From Garboard to the lower edge of sheerstrake. (a) 100A	From Garboard to the lower edge of sheerstrake. (a) 90A	From Garboard to the lower edge of sheerstrake. (a) 80A	Sheerstrake for all grades.	From main to upper sheerstrakes in Spar decked vessels. all grades.
		inches.	inches.	inches.	inches.	inches.	inches.		inches.	inches.	inches.	inches.	inches.	inches.	inches.	inches.	inches.	inches.	inches
31·5 and under 37	In Vessels where the numbers in Table G 1 are under 5200, the space of the frames from centre to centre is not to exceed 20 inches; where they are 5200, and under 8900, the space may be 21 inches; where the numbers are 8900 and under 13100, the space may be 22 inches; when 13100, and under 16600, the space may be 23 inches; when 16600, and under 48500, it may be 24 inches; and when 48500 and above, it may be 26 inches.	$2\frac{1}{2}\times2\frac{1}{2}\times\frac{5}{16}$	$2\frac{1}{2}\times2\frac{1}{2}\times\frac{5}{16}$	$2\frac{1}{4}\times2\frac{1}{4}\times\frac{4}{16}$	$\frac{4}{16}$	—	$2\frac{1}{4}$	2600 and under 3400	$6\times1\frac{1}{8}$	$5\frac{1}{2}\times1\frac{1}{8}$	$5\frac{1}{2}\times2\frac{1}{4}$	$30\times\frac{6}{16}$	$\frac{6}{16}$	$\frac{5}{16}$ & $\frac{6}{16}$	$\frac{5}{16}$	$\frac{4}{16}$ & $\frac{5}{16}$	$30\times\frac{6}{16}$	
37 and under 45		$3\times2\frac{1}{2}\times\frac{5}{16}$	$3\times2\frac{1}{2}\times\frac{5}{16}$	$2\frac{1}{2}\times2\frac{1}{2}\times\frac{4}{16}$	$\frac{4}{16}$	—	$2\frac{1}{2}$	3400 and under 5200	$6\frac{3}{4}\times1\frac{1}{4}$	$6\times1\frac{1}{4}$	$6\times2\frac{1}{2}$	" $\times\frac{7}{16}$	$\frac{6}{16}$	$\frac{6}{16}$	$\frac{5}{16}$ & $\frac{6}{16}$	$\frac{5}{16}$	" $\times\frac{7}{16}$	
45 and under 52		$3\times3\times\frac{6}{16}$	$3\times3\times\frac{5}{16}$	$2\frac{1}{2}\times2\frac{1}{2}\times\frac{5}{16}$	$\frac{4}{16}$	$2\frac{1}{2}$	$2\frac{3}{8}$	5200 and under 7200	$7\times1\frac{5}{8}$	$6\frac{1}{4}\times1\frac{5}{8}$	$6\frac{1}{4}\times3\frac{1}{4}$	" $\times\frac{8}{16}$	$\frac{7}{16}$	$\frac{6}{16}$ & $\frac{7}{16}$	$\frac{6}{16}$	$\frac{5}{16}$ & $\frac{6}{16}$	" $\times\frac{8}{16}$	
52 and under 57		$3\frac{1}{2}\times3\times\frac{6}{16}$	$3\frac{1}{2}\times3\times\frac{5}{16}$	$3\times2\frac{1}{2}\times\frac{5}{16}$	$\frac{5}{16}$	$2\frac{5}{8}$	$2\frac{3}{8}$	7200 and under 8900	$7\frac{1}{4}\times1\frac{7}{8}$	$6\frac{1}{2}\times1\frac{7}{8}$	$6\frac{1}{2}\times3\frac{3}{4}$	" $\times\frac{9}{16}$	$\frac{8}{16}$	$\frac{7}{16}$	$\frac{6}{16}$ & $\frac{7}{16}$	$\frac{6}{16}$	33 $\times\frac{9}{16}$	
57 and under 61		$3\frac{1}{2}\times3\times\frac{7}{16}$	$3\frac{1}{2}\times3\times\frac{6}{16}$	$3\times2\frac{1}{2}\times\frac{6}{16}$	$\frac{5}{16}$	$2\frac{3}{4}$	$2\frac{1}{2}$	8900 and under 10450	$7\frac{1}{2}\times2\frac{1}{8}$	$6\frac{3}{4}\times2\frac{1}{8}$	$6\frac{3}{4}\times4\frac{1}{4}$	$32\times\frac{9}{16}$	$\frac{8}{16}$	$\frac{7}{16}$ & $\frac{8}{16}$	$\frac{7}{16}$	$\frac{6}{16}$ & $\frac{7}{16}$	" $\times\frac{10}{16}$	
61 and under 65		$4\times3\times\frac{7}{16}$	$4\times3\times\frac{6}{16}$	$3\times3\times\frac{6}{16}$	$\frac{6}{16}$	$2\frac{7}{8}$	$2\frac{1}{2}$	10450 and under 11800	$7\frac{1}{2}\times2\frac{1}{4}$	$7\times2\frac{1}{4}$	$7\times4\frac{1}{2}$	" $\times\frac{9}{16}$	$\frac{8}{16}$	$\frac{8}{16}$	$\frac{7}{16}$ & $\frac{8}{16}$	$\frac{7}{16}$	" $\times\frac{10}{16}$	
65 and under 68		$4\times3\times\frac{7}{16}$	$4\times3\times\frac{6}{16}$	$3\times3\times\frac{6}{16}$	$\frac{6}{16}$	3	$2\frac{1}{2}$	11800 and under 13100	$8\times2\frac{3}{8}$	$7\times2\frac{3}{8}$	$7\times4\frac{3}{4}$	" $\times\frac{10}{16}$	$\frac{9}{16}$	$\frac{8}{16}$ & $\frac{9}{16}$	$\frac{8}{16}$	$\frac{7}{16}$ & $\frac{8}{16}$	36 $\times\frac{10}{16}$	
68 and under 71		$4\frac{1}{2}\times3\times\frac{7}{16}$	$4\frac{1}{2}\times3\times\frac{6}{16}$	$3\times3\times\frac{7}{16}$	$\frac{6}{16}$	$3\frac{1}{8}$	$2\frac{5}{8}$	13100 and under 14300	$8\times2\frac{3}{8}$	$7\frac{1}{4}\times2\frac{3}{8}$	$7\frac{1}{4}\times4\frac{3}{4}$	$34\times\frac{10}{16}$	$\frac{9}{16}$	$\frac{9}{16}$	$\frac{8}{16}$ & $\frac{9}{16}$	$\frac{8}{16}$	" $\times\frac{11}{16}$	$\frac{7}{16}$
71 and under 73		$4\frac{1}{2}\times3\times\frac{8}{16}$	$4\frac{1}{2}\times3\times\frac{7}{16}$	$3\times3\times\frac{7}{16}$	$\frac{6}{16}$	$3\frac{1}{4}$	$2\frac{5}{8}$	14300 and under 15500	$8\times2\frac{3}{8}$	$7\frac{1}{2}\times2\frac{3}{8}$	$7\frac{1}{2}\times4\frac{3}{4}$	" $\times\frac{11}{16}$	$\frac{10}{16}$	$\frac{9}{16}$ & $\frac{10}{16}$	$\frac{9}{16}$	$\frac{8}{16}$ & $\frac{9}{16}$	" $\times\frac{11}{16}$	$\frac{7}{16}$
73 and under 76		$5\times3\times\frac{8}{16}$	$5\times3\times\frac{7}{16}$	$3\times3\times\frac{7}{16}$	$\frac{6}{16}$	$3\frac{3}{8}$	$2\frac{5}{8}$	15500 and under 16600	$8\frac{1}{2}\times2\frac{1}{2}$	$8\times2\frac{1}{2}$	8×5	" $\times\frac{11}{16}$	$\frac{10}{16}$	$\frac{9}{16}$ & $\frac{10}{16}$	$\frac{9}{16}$	$\frac{8}{16}$ & $\frac{9}{16}$	" $\times\frac{12}{16}$	$\frac{7}{16}$
76 and under 80		$5\times3\times\frac{8}{16}$	$5\times3\times\frac{7}{16}$	$3\frac{1}{2}\times3\times\frac{8}{16}$	$\frac{7}{16}$	$3\frac{1}{2}$	$2\frac{3}{4}$	16600 and under 18700	$9\times2\frac{1}{2}$	$8\frac{1}{2}\times2\frac{1}{2}$	$8\frac{1}{2}\times5$	$36\times\frac{11}{16}$	$\frac{10}{16}$	$\frac{10}{16}$	$\frac{9}{16}$ & $\frac{10}{16}$	$\frac{9}{16}$	$40\times\frac{12}{16}$	$\frac{8}{16}$
80 and under 85		$5\times3\frac{1}{2}\times\frac{8}{16}$	$5\times3\frac{1}{2}\times\frac{7}{16}$	$3\frac{1}{2}\times3\frac{1}{2}\times\frac{8}{16}$	$\frac{7}{16}$	$3\frac{5}{8}$	$2\frac{3}{4}$	18700 and under 21700	$9\frac{1}{2}\times2\frac{1}{2}$	$9\times2\frac{1}{2}$	$9\times5\frac{1}{2}$	" $\times\frac{12}{16}$	$\frac{11}{16}$	$\frac{10}{16}$ & $\frac{11}{16}$	$\frac{10}{16}$	$\frac{9}{16}$ & $\frac{10}{16}$	" $\times\frac{13}{16}$	$\frac{8}{16}$
85 and under 92		$5\frac{1}{2}\times3\frac{1}{2}\times\frac{8}{16}$	$5\frac{1}{2}\times3\frac{1}{2}\times\frac{7}{16}$	$3\frac{1}{2}\times3\frac{1}{2}\times\frac{8}{16}$	$\frac{7}{16}$	$3\frac{5}{8}$	$2\frac{3}{4}$	21700 and under 26400	$10\times2\frac{3}{4}$	$10\times2\frac{3}{4}$	10×6	" $\times\frac{12}{16}$	$\frac{11}{16}$	$\frac{11}{16}$	$\frac{10}{16}$ & $\frac{11}{16}$	$\frac{10}{16}$	" $\times\frac{13}{16}$	$\frac{8}{16}$
92 and under 99		$5\frac{1}{2}\times3\frac{1}{2}\times\frac{9}{16}$	$5\frac{1}{2}\times3\frac{1}{2}\times\frac{8}{16}$	$4\times3\frac{1}{2}\times\frac{8}{16}$	$\frac{7}{16}$	$3\frac{3}{4}$	$2\frac{7}{8}$	26400 and under 30900	$11\times2\frac{3}{4}$	$11\times2\frac{3}{4}$	$11\times6\frac{1}{2}$	" $\times\frac{12}{16}$	$\frac{12}{16}$	$\frac{11}{16}$ & $\frac{12}{16}$	$\frac{11}{16}$	$\frac{10}{16}$ & $\frac{11}{16}$	" $\times\frac{13}{16}$	$\frac{8}{16}$
99 and under 104		$6\times3\frac{1}{2}\times\frac{9}{16}$	$6\times3\frac{1}{2}\times\frac{8}{16}$	$4\times3\frac{1}{2}\times\frac{9}{16}$	$\frac{7}{16}$	$3\frac{3}{4}$	$2\frac{7}{8}$	30900 and under 35200	11×3	11×3	11×7	" $\times\frac{13}{16}$	$\frac{12}{16}$	$\frac{12}{16}$	$\frac{11}{16}$ & $\frac{12}{16}$	$\frac{11}{16}$	" $\times\frac{13}{16}$	$\frac{8}{16}$
104 and under 110		$6\times3\frac{1}{2}\times\frac{10}{16}$	$6\times3\frac{1}{2}\times\frac{9}{16}$	$4\frac{1}{2}\times3\frac{1}{2}\times\frac{9}{16}$	$\frac{7}{16}$	4	3	35200 and under 40000	$11\times3\frac{1}{4}$	$11\times3\frac{1}{4}$	$11\times7\frac{1}{2}$	" $\times\frac{14}{16}$	$\frac{12}{16}$	$\frac{12}{16}$ & $\frac{13}{16}$	$\frac{12}{16}$	$\frac{11}{16}$ & $\frac{12}{16}$	" $\times\frac{14}{16}$	$\frac{9}{16}$
110 and under 115		$6\frac{1}{2}\times3\frac{1}{2}\times\frac{10}{16}$	$6\frac{1}{2}\times3\frac{1}{2}\times\frac{9}{16}$	$4\frac{1}{2}\times3\frac{1}{2}\times\frac{9}{16}$	$\frac{7}{16}$	$4\frac{1}{4}$	3	40000 and under 48500	$12\times3\frac{1}{4}$	$12\times3\frac{1}{4}$	12×8	" $\times\frac{14}{16}$	—	$\frac{13}{16}$	—	—	" $\times\frac{14}{16}$	$\frac{9}{16}$
115 and under 120		$7\times3\frac{1}{2}\times\frac{10}{16}$	$6\frac{1}{2}\times3\frac{1}{2}\times\frac{9}{16}$	$4\frac{1}{2}\times4\times\frac{9}{16}$	$\frac{7}{16}$	$4\frac{1}{2}$	$3\frac{1}{4}$	48500 and under 56000	$12\times3\frac{1}{2}$	$12\times3\frac{1}{2}$	$13\times8\frac{1}{2}$	" $\times\frac{15}{16}$	—	$\frac{13}{16}$ & $\frac{14}{16}$	—	—	" $\times\frac{15}{16}$	$\frac{9}{16}$
								56000 and under 67000	$12\times3\frac{3}{4}$	$12\times3\frac{3}{4}$	13×9	" $\times\frac{15}{16}$	—	$\frac{14}{16}$	—	—	" $\times\frac{16}{16}$	$\frac{9}{16}$

(a) In the columns for plating, where two thicknesses are given, they are to be worked in alternate strakes, and the large thickness is to apply to the outer strakes, and the smaller one to the inner strakes: and the size of the rivets and double riveting to be regulated by the thickness of the thicker plating, except where $\frac{9}{16}$ and $\frac{10}{16}$ outside plating is used alternately, when $\frac{3}{4}$ of an inch rivets may be used.

TABLE FOR SIZES OF FLOORS. *See* Section 7.

Floor plates under *Engines and Boilers* of Steam Vessels to be one-sixteenth of an inch thicker than given in this Table, where the plates are nine-sixteenths of an inch and under.

NUMBERS FOR FLOORS.	31 and under 32	32 to 33	33 to 34	34 to 35	35 to 37	37 to 39	39 to 41	41 to 43	43 to 45	45 to 47	47 to 49	49 to 51	51 to 52	52 to 53	53 to 55	55 to 56	56 to 57	57 to 58	58 to 59	59 to 60	60 to 62	62 to 63	63 to 64	64 to 65	65 to 66	66 to 67	67 to 68	68 to 69	69 to 70	70 to 71	71 to 72	72 to 73	73 to 74	74 to 76	76 to 78	78 to 80	80 to 84	84 to 88	88 to 92	92 to 98	98 to 105	105 to 110	110 to 115	115 to 120	120 to 126	NUMBERS FOR FLOORS
Sizes.	$9\times\frac{4}{16}$	$9\frac{1}{2}\times\frac{4}{16}$	$10\times\frac{4}{16}$	$10\frac{1}{2}\times\frac{4}{16}$	$11\times\frac{5}{16}$	$11\frac{1}{2}\times\frac{5}{16}$	$12\times\frac{5}{16}$	$12\times\frac{6}{16}$	$12\frac{1}{2}\times\frac{6}{16}$	$13\times\frac{6}{16}$	$13\frac{1}{2}\times\frac{6}{16}$	$14\times\frac{6}{16}$	$14\frac{1}{2}\times\frac{6}{16}$	$15\times\frac{6}{16}$	$15\frac{1}{2}\times\frac{6}{16}$	$15\frac{1}{2}\times\frac{7}{16}$	$16\times\frac{7}{16}$	$16\frac{1}{2}\times\frac{7}{16}$	$17\times\frac{7}{16}$	$17\frac{1}{2}\times\frac{8}{16}$	$18\times\frac{8}{16}$	$18\frac{1}{2}\times\frac{8}{16}$	$19\times\frac{8}{16}$	$19\frac{1}{2}\times\frac{8}{16}$	$20\times\frac{8}{16}$	$20\frac{1}{2}\times\frac{8}{16}$	$21\times\frac{8}{16}$	$21\times\frac{9}{16}$	$21\frac{1}{2}\times\frac{9}{16}$	$22\times\frac{9}{16}$	$22\frac{1}{2}\times\frac{9}{16}$	$23\times\frac{9}{16}$	$23\frac{1}{2}\times\frac{9}{16}$	$24\times\frac{9}{16}$	$24\times\frac{10}{16}$	$24\frac{1}{2}\times\frac{10}{16}$	$25\times\frac{10}{16}$	$26\times\frac{10}{16}$	$28\times\frac{10}{16}$	$30\times\frac{10}{16}$	$32\times\frac{10}{16}$	$34\times\frac{10}{16}$	$36\times\frac{10}{16}$	$38\times\frac{10}{16}$	Sizes.

Mem.—The Scantlings given in the above Table are intended for Vessels, the length of which does not exceed *eleven times* their depth *from top of keel, see Section* 1. For Vessels which exceed this proportion, *see Section* 46. For proportions of breadth to length, *see Table G.* 4.

Lloyd's Register of Shipping,
2, White Lion Court, Cornhill, London, *26th April*, 1883.

IRON VESSELS.

TABLE OF MINIMUM DIMENSIONS OF KEELS, STEMS,

NUMBERS. For Frames, Reversed Frames, Bulkheads, and Pillars.			BRACING OR SHAMMEL.	FRAMES FOR ALL GRADES.	
				Dimensions of angle iron for three-fifths the length of vessel amidships, and bulkheads.	Dimensions of angle iron below and abaft the three-fifths length.
				inches.	inches.
31·5	and under	37		2½ × 2½ × 1/2	2½ × 2½ × 1/2
37	and under	46		3 × 2½ × 1/2	3 × 2½ × 1/2
46	and under	52		3 × 3 × 1/2	3 × 3 × 1/2
52	and under	57		3½ × 3 × 1/2	3 × 2½ × 1/2
57	and under	61		3½ × 3 × 1/2	3 × 2½ × 1/2
61	and under	65		4 × 3 × 1/2	3 × 3 × 1/2
65	and under	68		4 × 3 × 1/2	3 × 3 × 1/2
68	and under	71		4½ × 3 × 1/2	3 × 3 × 1/2
71	and under	73		4½ × 3 × 1/2	3 × 3 × 1/2
73	and under	76		5 × 3 × 1/2	3 × 3 × 1/2
76	and under	80		5 × 3 × 1/2	3½ × 3 × 1/2
80	and under	85		5 × 3½ × 1/2	3½ × 3½ × 1/2
85	and under	92		5½ × 3½ × 1/2	3½ × 3½ × 1/2
92	and under	99		5½ × 3½ × 5/8	4 × 3½ × 5/8

Table G 1 are under 6500, the spece of the frames from centre to centre is not to exceed 20 inches; where may be 21 inches, where the numbers are 6500 and under 18100, the spece may be 22 inches; when 18100; when 16500, and under 18500, it may be 24 inches; and when 18500 and above, it may be 26 inches.

IRON VESSELS.

TABLE OF MINIMUM DIMENSIONS OF KEELS, STEMS,

NUMBERS. For Frames, Reversed Frames, Bulkheads, and Pillars.		BRACING OR FRAMES.	FRAMES FOR ALL GRADES.	
			Dimensions of angle iron for three-fifths the length of vessel amidships, and bulkheads.	Dimensions of angle iron before and abaft the three-fifths length.
31·5	and under 37		inches. $2\frac{1}{2} \times 2\frac{1}{2} \times \frac{1}{16}$	inches. $2\frac{1}{2} \times 2\frac{1}{2} \times \frac{1}{16}$
37	and under 46		$3 \times 2\frac{1}{2} \times \frac{1}{16}$	$3 \times 2\frac{1}{2} \times \frac{1}{16}$
46	and under 52		$3 \times 3 \times \frac{1}{16}$	$3 \times 3 \times \frac{1}{16}$
52	and under 57		$3\frac{1}{2} \times 3 \times \frac{1}{16}$	$3\frac{1}{2} \times 3 \times \frac{1}{16}$
57	and under 61		$3\frac{1}{2} \times 3 \times \frac{1}{16}$	$3\frac{1}{2} \times 3 \times \frac{1}{16}$
61	and under 65		$4 \times 3 \times \frac{1}{16}$	$4 \times 3 \times \frac{1}{16}$
65	and under 68		$4 \times 3 \times \frac{1}{16}$	$4 \times 3 \times \frac{1}{16}$
68	and under 71		$4\frac{1}{2} \times 3 \times \frac{1}{16}$	$4\frac{1}{2} \times 3 \times \frac{1}{16}$
71	and under 73		$4\frac{1}{2} \times 3 \times \frac{1}{16}$	$4\frac{1}{2} \times 3 \times \frac{1}{16}$
73	and under 76		$5 \times 3 \times \frac{1}{16}$	$5 \times 3 \times \frac{1}{16}$
76	and under 80		$5 \times 3 \times \frac{1}{16}$	$5 \times 3 \times \frac{1}{16}$
80	and under 85		$5 \times 3\frac{1}{2} \times \frac{1}{16}$	$5 \times 3\frac{1}{2} \times \frac{1}{16}$
85	and under 92		$5\frac{1}{2} \times 3\frac{1}{2} \times \frac{1}{16}$	$5\frac{1}{2} \times 3\frac{1}{2} \times \frac{1}{16}$
92	and under 99		$5\frac{1}{2} \times 3\frac{1}{2} \times \frac{1}{16}$	$5\frac{1}{2} \times 3\frac{1}{2} \times \frac{1}{16}$

Table G I are under 5500, the space of the frames from centre to centre is not to exceed 30 inches; where may be 21 inches, where the numbers are 5500 and under 18100, the space may be 22 inches; when ser; when 16500, and under 18500, it may be 24 inches; and when 18500 and above, it may be 26 inches.

IRON VESSELS.

TABLE G. 2.

TABLE OF MINIMUM DIMENSIONS OF KEELSONS, KEELSON AND STRINGER ANGLE IRONS, DECKS, RUDDERS, CEILING, AND WINDLASSES.

NUMBERS. To regulate keelsons stringers, decks, rudders, ceiling, and windlasses.	Size of middle-line keelsons standing upon floors, and thickness of rider plate to keelson for all grades.	Thickness of intercostal keelson plates and side plates for box keelsons, for all grades. (aa)	Dimensions of angle irons on upper deck beam stringer plates in one and two-decked vessels, also for keelsons, and stringers in hold, for all grades.	Dimensions of angle irons on the middle, lower or hold, and orlop beam stringer plates, on upper deck stringer plates in three-decked vessels and on spar-deck stringer plates, also for box keelsons, for all grades, and awning deck vessels.	RUDDER.				Thickness of upper deck, for all grades.	Thickness of wood ceiling in hold, to upper part of bilges.	WINDLASS.				NUMBERS. To regulate keelsons, stringers, decks, rudders, ceiling, and windlasses.
					Sailing Vessels.		Steam Vessels.				Sailing Vessels.		Steam Vessels.		
					Diameter at the head.	Diameter at the heel & pintle.	Diameter at the head.	Diameter at the heel & pintle.	(a) Wood.		Diameter of iron spindle.	Diameter of main piece.	Diameter of iron spindle.	Diameter of main piece.	
	inches.	inches.	inches.	inches.	inches.	inches.	inches.	inches.	inches.	inches.	inches.	inches.	inches.	inches.	
2600 and under 3400	$7\frac{1}{2} \times \frac{6}{16}$	$\frac{4}{16}$	$3 \times 3 \times \frac{6}{16}$	$2\frac{3}{4} \times 2\frac{3}{4} \times \frac{6}{16}$	$2\frac{7}{8}$	2	3	2	$2\frac{1}{2}$	2	$2\frac{1}{4}$	$12\frac{1}{2}$	2	12	2600 and under 3400
3400 and under 5200	$8\frac{1}{2} \times \frac{7}{16}$	$\frac{5}{16}$	$3 \times 3 \times \frac{6}{16}$	$3 \times 3 \times \frac{6}{16}$	3	2	$3\frac{1}{2}$	2	3	2	$2\frac{1}{2}$	14	$2\frac{1}{4}$	13	3400 and under 5200
5200 and under 7200	$10 \times \frac{8}{16}$	$\frac{5}{16}$	$3 \times 3 \times \frac{6}{16}$	$3 \times 3 \times \frac{6}{16}$	$3\frac{1}{2}$	2	$3\frac{3}{4}$	$2\frac{1}{4}$	3	2	$2\frac{3}{4}$	15	$2\frac{1}{2}$	14	5200 and under 7200
7200 and under 8900	$11 \times \frac{9}{16}$	$\frac{6}{16}$	$3\frac{1}{2} \times 3 \times \frac{6}{16}$	$3 \times 3 \times \frac{6}{16}$	$3\frac{3}{4}$	$2\frac{1}{4}$	$4\frac{1}{4}$	$2\frac{1}{2}$	$3\frac{1}{2}$	$2\frac{1}{2}$	3	16	$2\frac{3}{4}$	15	7200 and under 8900
8900 and under 10450	$12 \times \frac{9}{16}$	$\frac{6}{16}$	$4 \times 3 \times \frac{6}{16}$	$3\frac{1}{2} \times 3\frac{1}{2} \times \frac{6}{16}$	$4\frac{1}{4}$	$2\frac{1}{2}$	$4\frac{1}{2}$	$2\frac{3}{4}$	$3\frac{1}{2}$	$2\frac{1}{2}$	$3\frac{1}{4}$	17	$2\frac{3}{4}$	15	8900 and under 10450
10450 and under 11800	$12 \times \frac{10}{16}$	$\frac{7}{16}$	$4\frac{1}{2} \times 3 \times \frac{7}{16}$	$3\frac{1}{2} \times 3\frac{1}{2} \times \frac{7}{16}$	$4\frac{1}{2}$	$2\frac{3}{4}$	$4\frac{3}{4}$	$2\frac{3}{4}$	$3\frac{1}{2}$	$2\frac{1}{2}$	$3\frac{1}{2}$	18	3	16	10450 and under 11800
11800 and under 13100	$13 \times \frac{10}{16}$	$\frac{7}{16}$	$4\frac{1}{2} \times 3\frac{1}{2} \times \frac{7}{16}$	$3\frac{1}{2} \times 3\frac{1}{2} \times \frac{7}{16}$	$4\frac{3}{4}$	$2\frac{3}{4}$	5	3	$3\frac{1}{2}$	$2\frac{1}{2}$	$3\frac{5}{8}$	19	$3\frac{1}{4}$	17	11800 and under 13100
13100 and under 14300	$14 \times \frac{11}{16}$	$\frac{7}{16}$	$5 \times 3\frac{1}{2} \times \frac{7}{16}$	$3\frac{1}{2} \times 3\frac{1}{2} \times \frac{8}{16}$	5	3	$5\frac{1}{4}$	3	$3\frac{1}{2}$	$2\frac{1}{2}$	$3\frac{3}{4}$	20	$3\frac{1}{4}$	17	13100 and under 14300
14300 and under 15500	$15 \times \frac{11}{16}$	$\frac{7}{16}$	$5 \times 3\frac{1}{2} \times \frac{8}{16}$	$3\frac{1}{2} \times 3\frac{1}{2} \times \frac{8}{16}$	$5\frac{1}{4}$	3	$5\frac{1}{2}$	3	$3\frac{1}{2}$	$2\frac{1}{2}$	4	21	$3\frac{1}{2}$	18	14300 and under 15500
15500 and under 16600	$16 \times \frac{12}{16}$	$\frac{8}{16}$	$5 \times 3\frac{1}{2} \times \frac{9}{16}$	$4 \times 4 \times \frac{8}{16}$	$5\frac{1}{2}$	3	$5\frac{3}{4}$	3	4	$2\frac{1}{2}$	$4\frac{1}{4}$	22	$3\frac{5}{8}$	19	15500 and under 16600
16600 and under 18700	$17 \times \frac{12}{16}$	$\frac{8}{16}$	$5 \times 4 \times \frac{9}{16}$	$4 \times 4 \times \frac{9}{16}$	6	3	$6\frac{1}{4}$	$3\frac{1}{4}$	4	$2\frac{1}{2}$	$4\frac{1}{2}$	23	$3\frac{5}{8}$	19	16600 and under 18700
18700 and under 21700	$18 \times \frac{13}{16}$	$\frac{8}{16}$	$5\frac{1}{2} \times 4 \times \frac{9}{16}$	$4 \times 4 \times \frac{9}{16}$	$6\frac{1}{4}$	$3\frac{1}{4}$	7	$3\frac{1}{2}$	4	$2\frac{1}{2}$	$4\frac{5}{8}$	24	4	21	18700 and under 21700
21700 and under 26400	$19 \times \frac{13}{16}$	$\frac{9}{16}$	$6 \times 4 \times \frac{9}{16}$	$4 \times 4 \times \frac{9}{16}$	$6\frac{3}{4}$	$3\frac{1}{2}$	$7\frac{3}{4}$	$3\frac{3}{4}$	4	$2\frac{1}{2}$	$4\frac{5}{8}$	$25\frac{1}{2}$	$4\frac{1}{2}$	23	21700 and under 26400
26400 and under 30900	$21 \times \frac{14}{16}$	$\frac{9}{16}$	$6\frac{1}{2} \times 4 \times \frac{9}{16}$	$4 \times 4 \times \frac{9}{16}$	$7\frac{1}{2}$	$3\frac{3}{4}$	$8\frac{1}{2}$	4	4	$2\frac{1}{2}$	$4\frac{3}{4}$	27	$4\frac{5}{8}$	24	26400 and under 30900
30900 and under 35200	$23 \times \frac{14}{16}$	$\frac{9}{16}$	$6\frac{1}{2} \times 4\frac{1}{2} \times \frac{9}{16}$	$4 \times 4 \times \frac{9}{16}$	8	4	9	$4\frac{1}{2}$	4	$2\frac{1}{2}$	$4\frac{3}{4}$	$28\frac{1}{2}$	$4\frac{5}{8}$	$25\frac{1}{2}$	30900 and under 35200
35200 and under 40000	$26 \times \frac{14}{16}$	$\frac{9}{16}$	$6\frac{1}{2} \times 4\frac{1}{2} \times \frac{10}{16}$	$4 \times 4 \times \frac{9}{16}$	$8\frac{1}{2}$	$4\frac{1}{2}$	$9\frac{1}{2}$	$4\frac{3}{4}$	4	$2\frac{1}{2}$	5	30	$4\frac{3}{4}$	27	35200 and under 40000
40000 and under 48500	$28 \times \frac{14}{16}$	$\frac{9}{16}$	$6\frac{1}{2} \times 4\frac{1}{2} \times \frac{10}{16}$	$4 \times 4 \times \frac{9}{16}$	—	—	10	5	4	$2\frac{1}{2}$	—	—	—	—	40000 and under 48500
48500 and under 56000	$30 \times \frac{15}{16}$	$\frac{9}{16}$	$6\frac{1}{2} \times 4\frac{1}{2} \times \frac{10}{16}$	$4 \times 4 \times \frac{9}{16}$	—	—	$10\frac{1}{2}$	$5\frac{1}{4}$	4	$2\frac{1}{2}$	—	—	—	—	48500 and under 56000
56000 and under 67000	$32 \times \frac{15}{16}$	$\frac{9}{16}$	$6\frac{1}{2} \times 4\frac{1}{2} \times \frac{10}{16}$	$4 \times 4 \times \frac{9}{16}$	—	—	11	$5\frac{1}{2}$	4	$2\frac{1}{2}$	—	—	—	—	56000 and under 67000

(aa) The top and bottom plates of box keelsons to be one-sixteenth of an inch more in thickness than the side plates.

(a) When the deck is of Teak. it may be one-sixth less in thickness. When of iron it is to be in thickness as per Table G. 4, but where an iron deck is substituted for a wood one, it is not to be less than $\frac{8}{16}$ ins.

MEM.—The Scantlings given in the above Table are intended for Vessels, the length of which does not exceed *eleven times* their depth *from top of keel, see Section* 1. *For Vessels which exceed this proportion, see Section* 46. *For proportions of breadth to length, see Table G.* 4.

DIAMETER OF NUT AND SCREW BOLTS FOR FASTENING FLAT OF DECK.

3 ins. and under $3\frac{1}{2}$ ins.	$\frac{1}{2}$ inch.
$3\frac{1}{2}$,, ,, 4 ,, ...	$\frac{9}{16}$,,
4 inches	$\frac{5}{8}$,,

LLOYD'S REGISTER OF SHIPPING,
2, *White Lion Court, Cornhill,*
June 2nd, 1881.

IRON VESSELS.

TABLE G.

TABLE OF MINIMUM DIMENSIONS OF KEELSONS, KEELSON CEILING, AND WIN

NUMBER. To regulate keelsons, stringers, floors, frames, ceiling, and windlasses.	Size of middle-line keelsons standing upon floors, and thickness of rider plate to keelson for all grades.	Thickness of inter-costal keelson plates and side plates for box keel-sons, for all grades. (cc cc)	Dimensions of angle irons on upper deck beam stringer plates in one and two-decked vessels, also for keelsons, and stringers in hold, for all grades.	Dimensions of angle irons on the middle, lower or hold, and orlop beam stringer plates, on upper deck stringer plates in three-decked vessels and on spar-deck stringer plates, also for box keelsons, for all grades, and awning deck vessels.	Bolting Vessels.		RUDDE
					Diameter at the head.	Diameter at the heel of plate.	D
	inches.	inches.	inches.	inches.	inches.	inches.	
2600 and under 3400	7½ × $\frac{5}{8}$	$\frac{5}{16}$	3 × 3 × $\frac{5}{8}$	3 × 3 × $\frac{5}{8}$	2½	2	
3400 and under 5200	8½ × $\frac{5}{8}$	$\frac{5}{8}$	3 × 3 × $\frac{5}{8}$	3 × 3 × $\frac{5}{8}$	3	2	
5200 and under 7200	10 × $\frac{5}{8}$	$\frac{5}{8}$	3 × 3 × $\frac{5}{8}$	3 × 3 × $\frac{5}{8}$	3½	2	
7200 and under 8800	11 × $\frac{5}{8}$	$\frac{5}{8}$	3½ × 3 × $\frac{5}{8}$	3 × 3 × $\frac{5}{8}$	3½	2½	
8800 and under 10150	12 × $\frac{5}{8}$	$\frac{5}{8}$	4 × 3 × $\frac{5}{8}$	3½ × 3½ × $\frac{5}{8}$	4½	2½	
10150 and under 11800	12 × $\frac{5}{8}$	$\frac{11}{16}$	4½ × 3 × $\frac{5}{8}$	3½ × 3½ × $\frac{5}{8}$	4½	2½	
11800 and under 13100	13 × $\frac{5}{8}$	$\frac{11}{16}$	4½ × 3½ × $\frac{11}{16}$	3½ × 3½ × $\frac{5}{8}$	4½	2½	
13100 and under 14300	14 × $\frac{5}{8}$	$\frac{11}{16}$	5 × 3½ × $\frac{11}{16}$	3½ × 3½ × $\frac{5}{8}$	5	3	
14300 and under 15500	15 × $\frac{5}{8}$	$\frac{11}{16}$	5 × 3½ × $\frac{5}{8}$	3½ × 3½ × $\frac{5}{8}$	5½	3	
15500 and under 16600	16 × $\frac{5}{8}$	$\frac{5}{8}$	5 × 3½ × $\frac{5}{8}$	4 × 4 × $\frac{5}{8}$	5½	3	
16600 and under 18700	17 × $\frac{5}{8}$	$\frac{5}{8}$	5 × 4 × $\frac{5}{8}$	4 × 4 × $\frac{5}{8}$	6	3	

IRON VESSELS. Beams. TABLE G 3.

Length of Beam amid ships.	Upper and Lower Deck Beams in one and two decked vessels, Main and Lower Deck Beams in three decked and spar-decked Vessels, and Beams of raised quarter decks.				Upper Deck Beams in three-decked vessels. *(a)*				Size of Spar-deck Beams *(a)* all fore and aft, and Forecastle Beams.		Size of Awning Deck Beams and Full Poop Beams.		Hold Beams *(b)* of Extra Strength.		Angle Iron Beams, when Iron Decks are fitted in accordance with Section 23.	Length of Beam amid ships.
	Size of Beams amidships.		Size of Beams less than three-fourths the length of the mid-ship Beam.		Size of Beams amidships.		Size of Beams less than three-fourths the length of the mid-ship Beam.									
	Bulb Iron.	Single Angle Irons.	Bulb Iron.	Dbl. Ang. Irons.	Bulb Iron.	Dbl. Ang. Irons.	Bulb Iron.	Dbl. Ang. Irons.	Bulb Iron.	Dbl. Ang. Irons	Bulb Iron.	Single Angle Iron Beams.	Plate or Bulb Iron.	Size of Angle Irons.	Single Angle Irons.	
Feet.	ins. ins.	ins. ins. ins.	ins. ins.	ins. ins. ins.	ins. ins.	ins. ins. ins.	ins. ins.	ins. ins. ins.	ins. ins.	ins. ins. ins.	ins. ins.	ins. ins. ins.	ins. ins.	ins. ins. ins.	ins. ins. ins.	Feet.
16		$4\frac{1}{2}\times3\times\frac{6}{16}$														
18		$5\times3\times\frac{7}{16}$														
20	$5\times\frac{5}{16}$ Sng. Ang. Irn.	Dbl. Angl. Irons. $2\times2\times\frac{5}{16}$ $5\frac{1}{2}\times3\times\frac{7}{16}$														
22	$5\frac{1}{2}\times\frac{6}{16}$	$2\frac{1}{2}\times2\frac{1}{4}\times\frac{5}{16}$										$4\frac{1}{2}\times3\times\frac{6}{16}$			$4\times2\frac{1}{4}\times\frac{6}{16}$	22
24	$6\times\frac{6}{16}$	$2\frac{1}{2}\times2\frac{1}{2}\times\frac{5}{16}$	$5\frac{1}{2}\times\frac{5}{16}$	$2\frac{1}{2}\times2\frac{1}{2}\times\frac{5}{16}$								$5\times3\times\frac{6}{16}$	$7\times\frac{7}{16}$	$3\times3\times\frac{6}{16}$	$5\times3\times\frac{6}{16}$	24
26	$6\frac{1}{2}\times\frac{6}{16}$	$2\frac{1}{2}\times2\frac{1}{2}\times\frac{6}{16}$	$6\times\frac{6}{16}$	$2\frac{1}{2}\times2\frac{1}{2}\times\frac{6}{16}$	$6\times\frac{6}{16}$	$2\frac{1}{2}\times2\frac{1}{2}\times\frac{5}{16}$			$5\frac{1}{2}\times\frac{5}{16}$	$2\frac{1}{2}\times2\frac{1}{2}\times\frac{5}{16}$		$5\times3\times\frac{7}{16}$	$7\frac{1}{2}\times\frac{7}{16}$	$3\times3\times\frac{7}{16}$	$5\times3\times\frac{7}{16}$	26
28	$7\times\frac{7}{16}$	$3\times3\times\frac{6}{16}$	$6\frac{1}{2}\times\frac{6}{16}$	$3\times3\times\frac{6}{16}$	$6\frac{1}{2}\times\frac{6}{16}$	$2\frac{1}{2}\times2\frac{1}{2}\times\frac{6}{16}$	$6\times\frac{6}{16}$	$2\frac{1}{2}\times2\frac{1}{2}\times\frac{6}{16}$	$6\times\frac{6}{16}$	$2\frac{1}{2}\times2\frac{1}{2}\times\frac{5}{16}$		$5\frac{1}{2}\times3\times\frac{7}{16}$	$8\times\frac{8}{16}$	$4\times3\times\frac{7}{16}$	$5\frac{1}{2}\times3\times\frac{7}{16}$	28
30	$7\frac{1}{2}\times\frac{7}{16}$	$3\times3\times\frac{6}{16}$	$7\times\frac{7}{16}$	$3\times3\times\frac{6}{16}$	$7\times\frac{7}{16}$	$2\frac{1}{2}\times2\frac{1}{2}\times\frac{6}{16}$	$6\frac{1}{2}\times\frac{6}{16}$	$2\frac{1}{2}\times2\frac{1}{2}\times\frac{6}{16}$	$6\frac{1}{2}\times\frac{6}{16}$	$2\frac{3}{4}\times2\frac{3}{4}\times\frac{5}{16}$		$6\times3\times\frac{7}{16}$	$8\frac{1}{2}\times\frac{8}{16}$	$4\times3\times\frac{7}{16}$	$5\frac{1}{2}\times3\times\frac{8}{16}$	30
32	$8\times\frac{8}{16}$	$3\times3\times\frac{6}{16}$	$7\times\frac{7}{16}$	$3\times3\times\frac{6}{16}$	$7\times\frac{7}{16}$	$3\times3\times\frac{6}{16}$	$6\frac{1}{2}\times\frac{6}{16}$	$3\times3\times\frac{6}{16}$	$6\frac{1}{2}\times\frac{6}{16}$	$3\times2\frac{3}{4}\times\frac{5}{16}$		$6\frac{1}{2}\times3\times\frac{8}{16}$	$9\times\frac{9}{16}$	$4\times3\frac{1}{2}\times\frac{8}{16}$	$5\frac{1}{2}\times3\times\frac{8}{16}$ Bulb Angle.	32
34	$8\frac{1}{2}\times\frac{8}{16}$	$3\times3\times\frac{7}{16}$	$7\frac{1}{2}\times\frac{7}{16}$	$3\times3\times\frac{7}{16}$	$7\frac{1}{2}\times\frac{7}{16}$	$3\times3\times\frac{6}{16}$	$7\times\frac{7}{16}$	$3\times3\times\frac{6}{16}$	$7\times\frac{7}{16}$	$3\times3\times\frac{6}{16}$	$6\times\frac{6}{16}$	Dbl. Ang. Irons. $2\frac{1}{2}\times2\frac{1}{2}\times\frac{6}{16}$	$9\frac{1}{2}\times\frac{9}{16}$	$4\times4\times\frac{8}{16}$	$6\times3\times\frac{8}{16}$ Bulb Angle.	34
36	$9\times\frac{9}{16}$	$3\frac{1}{2}\times3\times\frac{7}{16}$	$8\times\frac{8}{16}$	$3\frac{1}{2}\times3\times\frac{7}{16}$	$8\times\frac{8}{16}$	$3\times3\times\frac{6}{16}$	$7\frac{1}{2}\times\frac{7}{16}$	$3\times3\times\frac{6}{16}$	$7\frac{1}{2}\times\frac{7}{16}$	$3\times3\times\frac{6}{16}$	$6\frac{1}{2}\times\frac{6}{16}$	$2\frac{1}{2}\times2\frac{1}{2}\times\frac{6}{16}$	$10\times\frac{10}{16}$	$4\times4\times\frac{9}{16}$	$6\frac{1}{2}\times3\times\frac{9}{16}$ Bulb Angle.	36
38	$9\frac{1}{2}\times\frac{9}{16}$	$3\frac{1}{2}\times3\frac{1}{2}\times\frac{7}{16}$	$8\frac{1}{2}\times\frac{8}{16}$	$3\frac{1}{2}\times3\frac{1}{2}\times\frac{7}{16}$	$8\frac{1}{2}\times\frac{8}{16}$	$3\frac{1}{2}\times3\times\frac{7}{16}$	$8\times\frac{8}{16}$	$3\frac{1}{2}\times3\times\frac{7}{16}$	$8\times\frac{8}{16}$	$3\times3\times\frac{6}{16}$	$7\times\frac{7}{16}$	$3\times2\frac{1}{2}\times\frac{6}{16}$	$10\frac{1}{2}\times\frac{10}{16}$	$4\frac{1}{2}\times4\times\frac{9}{16}$	$7\frac{1}{2}\times3\times\frac{9}{16}$ Bulb Angle	38
40	$10\times\frac{10}{16}$	$3\frac{1}{2}\times3\frac{1}{2}\times\frac{7}{16}$	$9\times\frac{9}{16}$	$3\frac{1}{2}\times3\frac{1}{2}\times\frac{7}{16}$	$9\times\frac{9}{16}$	$3\frac{1}{2}\times3\times\frac{7}{16}$	$8\frac{1}{2}\times\frac{8}{16}$	$3\frac{1}{2}\times3\times\frac{7}{16}$	$8\frac{1}{2}\times\frac{8}{16}$	$3\times3\times\frac{6}{16}$	$7\frac{1}{2}\times\frac{7}{16}$	$3\times3\times\frac{6}{16}$	$11\times\frac{11}{16}$	$5\times4\times\frac{9}{16}$	For beams 40ft. & above, bulb Plates to be used.	40
42	$10\frac{1}{2}\times\frac{10}{16}$	$3\frac{1}{2}\times3\frac{1}{2}\times\frac{8}{16}$	$9\times\frac{9}{16}$	$3\frac{1}{2}\times3\frac{1}{2}\times\frac{8}{16}$	$9\frac{1}{2}\times\frac{9}{16}$	$3\frac{1}{2}\times3\frac{1}{2}\times\frac{7}{16}$	$9\times\frac{9}{16}$	$3\frac{1}{2}\times3\frac{1}{2}\times\frac{7}{16}$	$9\times\frac{8}{16}$	$3\frac{1}{2}\times3\times\frac{7}{16}$	$8\times\frac{8}{16}$	$3\times3\times\frac{6}{16}$	$11\frac{1}{2}\times\frac{11}{16}$	$5\times4\times\frac{9}{16}$		42
44	$11\times\frac{10}{16}$	$3\frac{1}{2}\times3\frac{1}{2}\times\frac{8}{16}$	$9\frac{1}{2}\times\frac{9}{16}$	$3\frac{1}{2}\times3\frac{1}{2}\times\frac{8}{16}$	$10\times\frac{10}{16}$	$3\frac{1}{2}\times3\frac{1}{2}\times\frac{7}{16}$	$9\frac{1}{2}\times\frac{9}{16}$	$3\frac{1}{2}\times3\frac{1}{2}\times\frac{7}{16}$	$9\frac{1}{2}\times\frac{9}{16}$	$3\frac{1}{2}\times3\frac{1}{2}\times\frac{7}{16}$	$8\frac{1}{2}\times\frac{8}{16}$	$3\times3\times\frac{7}{16}$	$12\times\frac{12}{16}$	$5\frac{1}{2}\times4\times\frac{9}{16}$		44
46	$11\frac{1}{2}\times\frac{10}{16}$	$3\frac{1}{2}\times3\frac{1}{2}\times\frac{8}{16}$	$10\times\frac{10}{16}$	$3\frac{1}{2}\times3\frac{1}{2}\times\frac{8}{16}$	$10\times\frac{10}{16}$	$3\frac{1}{2}\times3\frac{1}{2}\times\frac{8}{16}$	$9\frac{1}{2}\times\frac{9}{16}$	$3\frac{1}{2}\times3\frac{1}{2}\times\frac{8}{16}$	$9\frac{1}{2}\times\frac{9}{16}$	$3\frac{1}{2}\times3\frac{1}{2}\times\frac{7}{16}$	$9\times\frac{9}{16}$	$3\frac{1}{2}\times3\times\frac{7}{16}$	$12\times\frac{12}{16}$	$6\times4\times\frac{9}{16}$		46
48	$12\times\frac{10}{16}$	$3\frac{1}{2}\times3\frac{1}{2}\times\frac{8}{16}$	$10\frac{1}{2}\times\frac{10}{16}$	$3\frac{1}{2}\times3\frac{1}{2}\times\frac{8}{16}$	$10\frac{1}{2}\times\frac{10}{16}$	$3\frac{1}{2}\times3\frac{1}{2}\times\frac{8}{16}$	$10\times\frac{10}{16}$	$3\frac{1}{2}\times3\frac{1}{2}\times\frac{8}{16}$	$10\times\frac{9}{16}$	$3\frac{1}{2}\times3\frac{1}{2}\times\frac{7}{16}$	$9\frac{1}{2}\times\frac{9}{16}$	$3\frac{1}{2}\times3\frac{1}{2}\times\frac{7}{16}$	$13\times\frac{13}{16}$	$6\times4\times\frac{10}{16}$		48
50	$12\times\frac{11}{16}$	$3\frac{1}{2}\times3\frac{1}{2}\times\frac{9}{16}$	$11\times\frac{10}{16}$	$3\frac{1}{2}\times3\frac{1}{2}\times\frac{8}{16}$	$11\times\frac{10}{16}$	$3\frac{1}{2}\times3\frac{1}{2}\times\frac{8}{16}$	$10\frac{1}{2}\times\frac{10}{16}$	$3\frac{1}{2}\times3\frac{1}{2}\times\frac{8}{16}$	$10\frac{1}{2}\times\frac{9}{16}$	$3\frac{1}{2}\times3\frac{1}{2}\times\frac{8}{16}$	$10\times\frac{9}{16}$	$3\frac{1}{2}\times3\frac{1}{2}\times\frac{7}{16}$	$13\times\frac{13}{16}$	$6\times4\times\frac{10}{16}$		50

The size of all beams (with the exception of those of spar decks, awning decks, poops and forecastles), which are not less in length than three-fourths of the length of the midship beam to be of the size given above for beams amidships; those of less length may be of the size given above, excepting those at hatchways exceeding in length four spaces of frames, mast and windlass beams, and beams under deck houses and the heel of bowsprit, which must not be less in size than the midship beam.

Strong beams in the machinery space must in all cases have double angle irons on their upper and lower edges.

No reduction is admitted at the ends of vessels in the size of spar and awning deck beams, and beams of poops and forecastles from those given above.

(a) The beams at the ends of hatchways exceeding in length six spaces of frames, must be equal in size to those of the main deck.

(b) These beams are to be formed of either a plate with double angle irons on its upper and lower edges, or a bulb plate with double angle irons and a covering plate on its upper edge. The beam plates and angle irons are to be of the sizes given above, and the broad flanges of the angle irons are to be fitted horizontally; the covering plate is to be of the thickness given for the angle irons.

Semi-box beams may be adopted in lieu thereof, formed of bulb plate and single angle irons of the sizes given for ordinary beams, secured in the usual way to two consecutive frames, and plated over by plating five sixteenths of an inch in thickness.

Lloyd's Register of Shipping,
London, 2nd June, 1881.

IRON VESSELS.

G. B. E. BOARDS.

TABLE G 4.

Table of Minimum Dimensions of Stringer Plates, Iron Decks, and Tie Plates.

PLATING NUMBERS OF VESSELS	2000 to 3000	3000	4000	5000	6000	7000	8000	9000	10000	11000	12000	13000	14000	15000	16000	17000	18000	19000	20000	21000	22000	23000	24000	25000	27000	28000	29000	31000	32000	34000	35000	36000	38000	39000	40000	42000	44000	46000	48000	50000	52000	54000	57000	60000	64000	68000	PLATING NUMBERS OF VESSELS
Under 10 Depths, or Under 7 Breadths in Length.	20×5/16	20×6/16	23×6/16	26×6/16	28×6/16	28×7/16	30×7/16	32×7/16	32×8/16	34×7/16	36×8/16	36×9/16	40×7/16	42×9/16	42×10/16	44×10/16	46×10/16	48×10/16	50×10/16	52×10/16	54×10/16	56×10/16	56×10/16 Iron Deck, ½ Length, 7/16.	58×10/16	60×10/16	62×10/16 Iron Deck, 7/16.	65×10/16	68×10/16	70×10/16 Iron Deck,	72×10/16	74×10/16.	56×12/16 Upr. &	57×10/16 ½ Mdl.	58×10/16 Decks, 7/16.	59×10/16 Up.&	60×10/16 Mid. Dks, 7/16.	62×10/16 UpDk 8-16&	64×11/16 Mdl.Dk.7-16	66×11/16 I. Up	68×11/16 & Mid.	70×11/16 Decks	72×11/16	74×11/16 I. Up Dk	76×11/16 Mid.	78×11/16 Dk. 8/16	80×11/16 I up&md Dks. 9/16	Under 10 Depths, or Under 7 Breadths in Length.
10 to 11 Depths, or 7 to 7½ Breadths.	22×5/16	22×6/16	25×6/16	28×6/16	31×6/16	32×7/16	34×7/16	36×7/16	36×8/16	38×8/16	40×7/16	40×9/16	44×8/16	46×9/16	46×10/16	48×10/16	50×10/16	52×10/16	50×10/16 Iron Deck,	52×10/16 Deck,	54×10/16 k, ½-	56×10/16 Length,	58×10/16 th,	61×10/16 7/16.	63×10/16 Iron Deck, 6/16.	65×10/16 7/16.	68×10/16	70×10/16 Iron	72×10/16 Deck,	74×10/16 7/16.	55×10/16 Upr. &	56×10/16 ½ Mdl.	57×10/16 Decks, 7/16.	58×10/16 Up.& Md.	59×10/16 Dks. 7/16.	60×10/16 UpDk 8-16&	62×10/16 Mdl.Dk.7/16	64×11/16 I. Up	66×11/16 & Mid.	68×11/16 Decks	70×11/16	72×11/16 I. Up Dk	74×11/16 Mid	76×11/16 Dk. 8/16	78×11/16 I.up&md	80×11/16 dks. 9/16	10 to 11 Depths, or 7 to 7½ Breadths.
11 to 12 Depths, or 7½ to 8 Breadths.	24×5/16	25×6/16	28×6/16	31×6/16	34×6/16	36×7/16	38×7/16	40×7/16	40×8/16	42×8/16	44×8/16	44×9/16	48×9/16	50×9/16	50×10/16	48×10/16 Iron Deck, half	50×10/16 Deck, half	52×10/16 Length,	54×10/16 Length,	56×10/16	58×10/16	60×10/16 Iron	62×10/16 Deck,	64×10/16 Deck,	66×10/16 6/16.	68×10/16	70×10/16 Iron	72×10/16 Deck,	74×10/16 7/16.	54×10/16 Upr. &	55×10/16 ½ Mdl.	56×10/16 Dk. 7/16.	57×10/16 Upr.& Md.	58×10/16 d.Dks.7/16	59×11/16 U dk 7/16&	60×11/16 & MdDk 7/16	62×11/16 I. Up	64×11/16 & Mid.	66×11/16 Decks	68×11/16 7/16	70×11/16 I. Up Dk	72×11/16 Mid	74×11/16 Dk. 7/16	76×11/16 Iron Up.	78×11/16 and Mid.	80×11/16 Dks. 9/16	11 to 12 Depths, or 7½ to 8 Breadths.
12 to 13 Depths, or 8 to 8½ Breadths.	24×6/16	25×7/16	28×7/16	31×7/16	34×7/16	36×8/16	38×8/16	40×8/16	40×9/16	42×8/16	44×9/16	44×10/16	48×10/16	48×10/16	50×10/16 Iron	52×10/16 Deck, half	54×10/16 half	56×10/16 Length,	58×10/16 6/16.	58×10/16	60×10/16 Iron	62×10/16 Deck,	64×10/16 Deck,	66×10/16 6/16.	68×10/16 Iron	70×10/16 Deck,	72×10/16 Deck,	74×10/16 7/16.	54×10/16 Upr. &	55×10/16 ½ Mdl.	56×10/16 Dks., 7/16.	57×10/16 Up & Mdl	58×10/16 l Dks 7/16.	59×10/16 Up.dk 7/16	60×11/16 Md.dk 7/16	61×11/16 I.	63×11/16 Upper	65×11/16 & Mid.	67×11/16 Dks. 7/16	69×11/16 I.Up Dk	71×11/16 Mid.	73×11/16 Dk. 7/16	75×11/16 Iron Up.	77×11/16 and Mid.	79×11/16 Dks. 9/16	81×11/16 (UD9/16, MD9-16LD7-16	12 to 13 Depths, or 8 to 8½ Breadths.
13 to 14 Depths, or 8½ to 9 Breadths.	27×6/16	28×7/16	31×7/16	34×7/16	37×7/16	40×8/16	42×8/16	44×8/16	44×9/16	46×9/16	48×9/16	48×10/16	50×10/16 Iron Deck,	52×10/16 k, half	54×10/16 Length,	55×10/16 9/16.	57×10/16	59×10/16 Iron	60×10/16	61×10/16 Deck,	62×10/16 k,	64×10/16 6/16.	66×10/16	68×10/16 Iron Deck,	70×10/16	72×10/16 7/16.	74×10/16	53×10/16 Upr. &	54×10/16 ½ Mdl. D	55×10/16 ecks, 7/16.	56×10/16 Up.& Md.	57×10/16 l.Dks.7/16	58×10/16 Up.dk 7/16	59×10/16 Md dk 7/16	60×11/16 I. Up	61×11/16 & Mdl.	63×11/16 Decks,	65×11/16 6/16.	67×11/16 I. Up Dk	69×11/16 9/16, Mid.	71×11/16 Dk. 7/16	73×11/16 Iron Up.	75×11/16 and Mid	77×11/16 Dks., 9/16	79×11/16 Ludd10/16.m	81×11/16 d 9/16ld 7/16	13 to 14 Depths, or 8½ to 9 Breadths.
14 to 15 Depths, or 9 to 9½ Breadths.	30×6/16	31×7/16	31×7/16	34×7/16	37×7/16	40×8/16	42×9/16	44×9/16	44×10/16	44×10/16	47×10/16 Iron Deck,	50×10/16 Deck,	52×10/16 ½ Length,	54×10/16 Length, 7/16	56×10/16	58×10/16 Iron	59×10/16	60×10/16 Deck,	61×10/16	62×10/16 7/16.	64×10/16	66×10/16 Iron Deck,	68×10/16	70×10/16 Deck, 7/16.	72×10/16 7/16.	52×10/16 Upr. &	53×10/16 ½ Mdl.	54×10/16 Dks., 7/16.	55×10/16 Upr.	56×10/16 & Mdl.	57×10/16 Dks. 7/16.	58×10/16 Up.dk 7/16	59×10/16 Md.dk 7/16	60×11/16 Iron Up	61×11/16 & Middle	62×11/16 e Dks.,	64×11/16 8/16.	66×11/16 I. Up Dk.	68×11/16 9/16. Mid	70×11/16 Dk. 7/16	72×11/16 Iron Up.	74×11/16 and Mid.	76×11/16 Dks , 9/16	78×11/16 I.U.D.10/16	80×11/16 MdDk 9/16	82×11/16 L Dk. 7/16	14 to 15 Depths, or 9 to 9½ Breadths.
15 to 16 Depths, or 9½ to 10 Breadths.	33×6/16	34×7/16	34×7/16	38×8/16	40×8/16	44×9/16	46×9/16	48×9/16 Iron	48×10/16 Deck,	50×10/16 half	52×10/16 Length.	54×10/16 6/16.	56×10/16	57×10/16 Iron	58×10/16	59×10/16 Deck,	60×10/16	61×10/16 6/16.	62×10/16 Iron	64×10/16	66×10/16 Deck,	68×10/16 7/16.	70×10/16	50×10/16 Upper &	51×10/16 ½ Mdl.	52×10/16 Dks, 7/16.	53×10/16 Up. &	54×10/16 Middle	55×10/16 Decks,	56×10/16 7/16.	57×10/16 Up.dk 7/16	58×10/16 Md.dk 7/16	59×10/16 Iron Up	60×11/16 and Mid	61×11/16 dle Decks	62×11/16 7/16.	64×11/16 I. Up Dk.	66×11/16 9/16. Mid	68×11/16 Dk. 7/16	70×11/16 Iron Up.	72×11/16 and Mid.	74×11/16 Dks , 9/16	76×11/16 I U.D.10/16	78×11/16 MdDk 9/16	80×11/16 L. Dk. 7/16	82×11/16 (LU & M Dk. 10/16, LD7/16	15 to 16 Depths, or 9½ to 10 Breadths.
16 to 17 Depths, or 10 to 10½ Breadths.	—	—	—	—	—	—	—	49×9/16	51×10/16	53×10/16	54×10/16 Iron Deck,	56×10/16 Deck,	57×10/16 9/16.	58×10/16	59×10/16	60×10/16	61×10/16	62×10/16 Iron Deck,	64×10/16 Iron Deck,	66×10/16 7/16.	68×10/16	49×10/16 Upr. &	50×10/16 ½ Mdl. D	51×10/16 ecks, 7/16.	52×10/16 Upper	53×10/16 and Middle	54×10/16 Decks,	54×10/16 7/16.	55×10/16 Upr. Dk.	56×10/16 7/16.& Mdl	57×10/16 Dk. 7/16.	58×10/16 Iron Up	60×11/16 per and	61×10/16 Middle D	62×11/16 ecks, 7/16.	63×11/16 I. Up Dk	65×11/16 9/16 Mid.	67×11/16 Dk. 7/16	69×11/16 I. Up	71×11/16 and Mid.	73×11/16 Dks. 9/16	75×11/16 L.U.D.10/16	77×11/16 MdDk 9/16	79×11/16 L. Dk. 7/16	81×10/16 I.up&md	83×11/16 10/16. l d 7/16	16 to 17 Depths, or 10 to 10½ Breadths
Over 17 Depths, or Over 10½ Breadths.	—	—	—	—	—	—	—	—	—	54×10/16 I	56×10/16 r o n	57×10/16	58×10/16 D e c	59×10/16 k,	60×10/16 7/16.	61×10/16	62×10/16	64×10/16	66×10/16	48×10/16 Upr. &	49×10/16 ½ Mdl.	50×10/16 Decks,	51×10/16 7/16.	52×10/16 Upper &	53×10/16 Mdl. D	54×10/16 ecks, 7/16.	55×10/16 Upr. Dk	56×10/16 7/16.& M	57×10/16 dl.Dk. 7/16	58×10/16 Iron	59×10/16 Upper	60×11/16 and Mi	61×11/16 ddle Decks,	62×11/16 7/16.	63×11/16 I. Up Dk.	64×11/16 9/16, Mid.	66×11/16 Dk. 7/16	68×11/16 I. Up	70×11/16 and Mid.	72×11/16 Decks, 9/16	74×11/16 L.U.D.10/16	76×11/16 Md Dk 9/16	78×11/16 L Dk. 7/16	80×11/16 L.U.D &	82×11/16 MdDk 9/16	84×11/16 L. Dk. 7/16	Over 17 Depths, or Over 10½ Breadths.
Ends of Main Stringer Plates.	—	—	15×6/16	17×6/16	19×6/16	19×6/16	20×6/16	22×6/16	22×7/16	23×7/16	24×7/16	24×8/16	26×8/16	28×8/16	28×9/16	29×9/16	30×9/16	31×7/16	32×8/16	33×9/16	35×9/16	36×9/16	36×9/16	37×9/16	38×9/16	40×9/16	41×9/16	42×9/16	43×9/16	44×9/16	45×9/16	45×9/16	46×9/16	47×9/16	48×9/16	49×9/16	50×9/16	51×9/16	52×9/16	53×9/16	54×9/16	55×9/16	56×9/16	57×9/16	58×9/16	60×9/16	Ends of Main Stringer Plates.
Hold Beam Stringer Plates (extreme breadth) *Ends of ditto.*	—	—	—	—	—	20×6/16	21×6/16	22×6/16	23×7/16	25×7/16	27×7/16	28×8/16	29×8/16	30×8/16	31×9/16	32×9/16	33×9/16	34×7/16	35×9/16	37×9/16	38×9/16	39×9/16	40×7/16	41×9/16	42×9/16	43×9/16	44×9/16	45×9/16	46×9/16	47×9/16	48×9/16	50×9/16	51×9/16	52×9/16	53×10/16	54×10/16	55×10/16	56×10/16	57×10/16	58×10/16	59×10/16	60×10/16	61×10/16	62×10/16	63×10/16	64×10/16	Hold Beam Stringer Plates (extreme breadth) *Ends of ditto.*
	—	—	—	—	—	16×6/16	16×8/16	17×6/16	18×8/16	19×8/16	21×6/16	22×7/16	23×7/16	24×7/16	24×9/16	25×9/16	26×9/16	26×7/16	27×7/16	28×7/16	29×7/16	30×7/16	31×7/16	32×8/16	33×8/16	33×9/16	34×9/16	35×9/16	36×9/16	36×9/16	37×8/16	38×8/16	40×9/16	41×8/16	41×9/16	42×9/16	43×8/16	44×8/16	45×9/16	46×8/16	47×9/16	48×9/16	49×8/16	50×9/16	51×9/16	52×9/16		
Tie Plates on Beams, Fore-and-Aft, and Diagonal.	—	—	7×6/16	7×6/16	7×7/16	8×7/16	8×7/16	9×7/16	9×8/16	10×7/16	10×8/16	10×9/16	11×8/16	12×9/16	12×10/16	13×10/16	13×10/16	13×10/16	14×10/16	14×10/16	15×10/16	15×10/16	16×10/16	16×10/16	17×10/16	17×10/16	18×10/16	18×10/16	19×10/16	19×10/16	20×10/16	20×10/16	21×10/16	21×10/16	22×10/16	23×10/16	24×10/16	25×10/16	26×10/16	27×10/16	28×10/16	29×10/16	30×10/16	31×10/16	32×10/16		Tie Plates on Beams, Fore-and-Aft, and Diagonal.

Dimensions of Main Stringer Plates, &c.

The depths for proportions to be taken from upper side of keel to top of upper deck beams in one, two, and three deck ships, and to top of main deck in spar and awning deck vessels; and, in spar-decked vessels, one depth may be taken off the proportions, so that in a spar-decked vessel of twelve and under thirteen depths in length, the stringers, &c., may be of the sizes given in the above Table for vessels of eleven and under twelve depths in length; and so on.

In *two decked vessels* the main stringer plates given in the above Table are to be fitted to the upper deck beams.

In *three decked vessels* the main stringer and tie plates given in the above Table are to be fitted to the upper deck beams, and the stringer and tie plates required for the middle deck beams are to be of the same width as those given in the Table, but they may be one-sixteenth of an inch less in thickness.

In *spar decked vessels* the main stringer and tie plates given in the above Table are to be fitted to the main deck beams; and the stringer and tie plates required for the spar deck beams are to be the breadth of, and may be two-sixteenths of an inch less in thickness than the stringer plates given on the upper line of the Table for vessels of the same plating number, and may be reduced at their ends to seven-sixteenths of an inch thick and to the breadth given for the ends of the main deck stringer plate in the Table.

All stringer plates are to maintain their midship breadth for one-half the vessel's length amidships, from thence the breadth may be gradually reduced to that given above for the ends of the vessel.

Where a reduction of two-sixteenths of an inch from the midship thickness is allowed for the ends, the stringer plates may be reduced one-sixteenth of an inch in thickness for one-eighth of the vessel's length before and abaft the half length amidships, and from thence to the ends they may be reduced another sixteenth of an inch in the thickness.

In *awning decked vessels* the main stringer and tie plates given in the above Table are to be fitted to the main deck beams, and the stringer plates required for the awning deck beams are to be of the same width as those given in the Table for hold beam stringer plates, and to be six-sixteenths of an inch in thickness where the plating number is under 14000, and seven-sixteenths of an inch where the plating number is 14000 or above.

Where there is an *iron deck* prescribed either for the entire length of the vessel, or for half the length amidships, it is to be fitted to the upper deck beams in two decked vessels. In three decked vessels and spar-decked vessels it may be fitted either to the upper or middle deck beams.

In way of an *iron deck* or *half-iron deck*, the stringer plates may be reduced in width to one inch for every seven feet of the length of the vessel, but the thickness is to be as given above. Where more than one iron deck is required the stringer plates are to be of the breadth and thickness given in the Table.

Where an *iron deck* is prescribed in the Table to be fitted for one half the vessel's length amidships, it is to be maintained the full breadth of the vessel for that length, and then tapered gradually into the stringer plates for one-eighth the vessel's length at each end.

Where *diagonal tie plates* are to be fitted on the beams in sufficient number, and to the satisfaction of the Surveyor, their breadth as given in the Table may be deducted from the breadth given above for the stringer plates amidships, in which case the stringer plates may be reduced in breadth at the ends of the vessel to three-fourths of their breadth amidships.

Orlop stringer plates where required to be fitted, to be of the same thickness as the hold beam stringer plates, and three-fourths the breadth of the same.

IRON VESSELS.

TABLE G 5.

Showing diameters and spacing of Rivets and breadths of Straps and Laps.

	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.
Thickness of PLATES	$\frac{5}{16}$	$\frac{6}{16}$	$\frac{6\,\&\,7}{16}$ altrnatly	$\frac{7}{16}$	$\frac{8}{16}$	$\frac{9}{16}$	$\frac{9\,\&\,10}{16}$ altrnatly	$\frac{10}{16}$ (b)	$\frac{11}{16}$	$\frac{12}{16}$	$\frac{12\,\&\,13}{16}$ altrnatly	$\frac{13}{16}$	$\frac{14}{16}$	$\frac{15}{16}$	$\frac{16}{16}$
Diameter of RIVETS	$\frac{5}{8}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{3}{4}$	$\frac{3}{4}$	$\frac{3}{4}$	$\frac{3}{4}$	$\frac{7}{8}$	$\frac{7}{8}$	$\frac{7}{8}$	1	1	1	$1\frac{1}{8}$	$1\frac{1}{8}$
Breadth of TREBLE riveted STRAPS	....	....	....	....	$14\frac{1}{4}$	$14\frac{1}{4}$	$14\frac{1}{4}$	$16\frac{3}{4}$	$16\frac{3}{4}$	$16\frac{3}{4}$	19	19	19	$21\frac{1}{4}$	$21\frac{1}{4}$
,, ,, DOUBLE ,, ,,	8	8	$9\frac{3}{4}$	$9\frac{3}{4}$	$9\frac{3}{4}$	$9\frac{3}{4}$	$9\frac{3}{4}$	$11\frac{1}{4}$	$11\frac{1}{4}$	$11\frac{1}{4}$	....	....	....	....	....
,, ,, DOUBLE ,, LAPS	$3\frac{3}{4}$	$3\frac{3}{4}$	$4\frac{1}{2}$	$4\frac{1}{2}$	$4\frac{1}{2}$	$4\frac{1}{2}$	$4\frac{1}{2}$	$5\frac{1}{4}$	$5\frac{1}{4}$	$5\frac{1}{4}$	6	6	6	$6\frac{3}{4}$	$6\frac{3}{4}$
,, ,, SINGLE ,, ,,	$2\frac{1}{4}$	$2\frac{1}{4}$	$2\frac{1}{2}$	$2\frac{1}{2}$	$2\frac{1}{2}$	....	....	....	....	....	....	....	....	....	....
MAXIMUM Spacing of Rivets from centre to centre.... in BUTTS of outside plating	$2\frac{1}{2}$	$2\frac{1}{2}$	3	3	3	3	3	$3\frac{1}{2}$	$3\frac{1}{2}$	$3\frac{1}{2}$	4	4	4	$4\frac{1}{2}$	$4\frac{1}{2}$
in EDGES ,, ,,	$2\frac{3}{4}$	$2\frac{3}{4}$	$3\frac{3}{8}$	$3\frac{3}{8}$	$3\frac{3}{8}$	$3\frac{3}{8}$	$3\frac{3}{8}$	4	4	4	$4\frac{1}{2}$	$4\frac{1}{2}$	$4\frac{1}{2}$	5	5
in FRAMES	5	5	6	6	6	6	6	7	7	7	8	8	8	....	....

Minimum number of Rivets in edges of Plating between Frames AMIDSHIPS.

	NUMBER OF RIVETS IN EACH ROW.														
DIAMETER OF RIVETS.....	Ins. $\frac{5}{8}$	Ins. $\frac{5}{8}$	Ins. $\frac{3}{4}$	Ins. $\frac{3}{4}$	Ins. $\frac{3}{4}$	Ins. $\frac{3}{4}$	Ins. $\frac{3}{4}$	Ins. $\frac{7}{8}$	Ins. $\frac{7}{8}$	Ins. $\frac{7}{8}$	Ins. 1	Ins. 1	Ins. 1	Ins. $1\frac{1}{8}$	Ins. $1\frac{1}{8}$
Spacing of FRAMES .....20 ins.....	7	7	5	5	5	5	....	....	....	....	....	....	....	....	....
,, ,, ,, ...21 ,, ...	....	7	6	6	6	6	6	5	5	....	....	....	....	....	....
,, ,, ,, ...22 ,, ...	....	....	6	6	6	6	6	5	5	5	....	....	....	....	....
,, ,, ,, ...23 ,, ...	....	....	6	6	6	6	6	5	5	5	5	5	5	....	....
,, ,, ,, ...24 ,, ...	....	....	7	7	7	7	7	6	6	6	5	5	5	....	....
,, ,, ,, ...26 ,, ...	....	....	....	....	....	....	....	....	....	....	....	5	5	5	5

Where the fore and aft flange of the frame does not exceed 3 inches, the rivets attaching the outside plating thereto should not exceed $\frac{7}{8}$ inch in diameter, and where it is $3\frac{1}{2}$ inches wide, they should not exceed 1 inch in diameter.

(b) Where stringer and tie plates are $\frac{10}{16}$ of an inch thick, they should be secured to the beams with $\frac{3}{4}$ of an inch rivets.

RIVETS to be $\frac{1}{4}$ of an inch larger in diameter in the **STEM, STERN POST** and **KEEL**, but in no case need these exceed $1\frac{1}{4}$ inches in diameter.

Lloyd's Register of Shipping,
2, White Lion Court, Cornhill, December 22nd, 1881.

TABLE G 5.

Showing diameters and spacing of Rivets and breadths of Str

Thickness of PLATES							
Diameter of RIVETS							
Breadth of TREBLE riveted STRAPS							
" " DOUBLE " "							
" " DOUBLE " LAPS							
" " SINGLE " "							
MAXIMUM Spacing of Rivets from centre to centre....	in BUTTS of outside plating						
	in EDGES " "						
	in FRAMES						

Minimum number of Rivets in edges of Plating between Fram

DIAMETER OF RIVETS.....							
Spacing of FRAMES .....20 ins.							
" " " .....21 "							
" " " .....22 "							
" " " .....23 "							
" " " .....24 "							
" " " .....26 "							

TABLE OF SCANTLINGS FOR DOUBLE BOTTOMS CONSTRUCTED ON THE CELLULAR SYSTEM.

PLATING NUMBER FOR REGULATING SCANTLINGS.	Centre Girder. — Depth above Top of Keel and Thickness.	Thickness of Side Girders	Margin Plate. — Depth (exclusive of Flange) and Thickness.	Thickness of Inner Bottom Plating.			Thickness of Brack't on Floor Plates	DIMENSIONS OF ANGLE IRONS.		
				Middle Line Strake.	In Engine and Boiler Space.	In Holds.		On Centre Girder.	On Margin Plates.	On Side Girders, Intermediate, and Vertical Angle Irons.
—— under 11,000	32 × $\frac{8}{16}$	$\frac{5}{16}$	18 × $\frac{6}{16}$	$\frac{6}{16}$	$\frac{6}{16}$	$\frac{5}{16}$	$\frac{5}{16}$	$3\frac{1}{2} \times 3\frac{1}{2} \times \frac{7}{16}$	3 × 3 × $\frac{6}{16}$	3 × $2\frac{1}{2}$ × $\frac{5}{16}$
11,000 and under 13,000	33 × $\frac{8}{16}$	$\frac{6}{16}$	19 × $\frac{7}{16}$	$\frac{7}{16}$	$\frac{7}{16}$	$\frac{6}{16}$	$\frac{6}{16}$	$3\frac{1}{2} \times 3\frac{1}{2} \times \frac{7}{16}$	$3\frac{1}{2} \times 3\frac{1}{2} \times \frac{7}{16}$	3 × $2\frac{1}{2}$ × $\frac{6}{16}$
13,000 ,, 15,000	34 × $\frac{8}{16}$	$\frac{6}{16}$	20 × $\frac{7}{16}$	$\frac{7}{16}$	$\frac{7}{16}$	$\frac{6}{16}$	$\frac{6}{16}$	$3\frac{1}{2} \times 3\frac{1}{2} \times \frac{7}{16}$	$3\frac{1}{2} \times 3\frac{1}{2} \times \frac{7}{16}$	3 × 3 × $\frac{6}{16}$
15,000 ,, 18,000	35 × $\frac{9}{16}$	$\frac{6}{16}$	21 × $\frac{7}{16}$	$\frac{8}{16}$	$\frac{7}{16}$	$\frac{6}{16}$	$\frac{6}{16}$	4 × 4 × $\frac{8}{16}$	$3\frac{1}{2} \times 3\frac{1}{2} \times \frac{7}{16}$	3 × 3 × $\frac{6}{16}$
18,000 ,, 21,000	36 × $\frac{9}{16}$	$\frac{6}{16}$	22 × $\frac{7}{16}$	$\frac{8}{16}$	$\frac{7}{16}$	$\frac{6}{16}$	$\frac{6}{16}$	4 × 4 × $\frac{9}{16}$	$3\frac{1}{2} \times 3\frac{1}{2} \times \frac{7}{16}$	3 × 3 × $\frac{7}{16}$
21,000 ,, 24,000	38 × $\frac{10}{16}$	$\frac{6}{16}$	24 × $\frac{7}{16}$	$\frac{9}{16}$	$\frac{7}{16}$	$\frac{6}{16}$	$\frac{6}{16}$	4 × 4 × $\frac{9}{16}$	$3\frac{1}{2} \times 3\frac{1}{2} \times \frac{8}{16}$	$3\frac{1}{2} \times 3\frac{1}{2} \times \frac{7}{16}$
24,000 ,, 28,000	40 × $\frac{10}{16}$	$\frac{7}{16}$	26 × $\frac{7}{16}$	$\frac{9}{16}$	$\frac{7}{16}$	$\frac{6}{16}$	$\frac{7}{16}$	4 × 4 × $\frac{9}{16}$	$3\frac{1}{2} \times 3\frac{1}{2} \times \frac{8}{16}$	$3\frac{1}{2} \times 3\frac{1}{2} \times \frac{7}{16}$
28,000 ,, 33,000	42 × $\frac{10}{16}$	$\frac{7}{16}$	28 × $\frac{8}{16}$	$\frac{9}{16}$	$\frac{8}{16}$	$\frac{7}{16}$	$\frac{7}{16}$	4 × 4 × $\frac{9}{16}$	4 × 4 × $\frac{8}{16}$	$3\frac{1}{2} \times 3\frac{1}{2} \times \frac{7}{16}$
33,000 ,, 38,000	44 × $\frac{10}{16}$	$\frac{7}{16}$	30 × $\frac{8}{16}$	$\frac{10}{16}$	$\frac{8}{16}$	$\frac{7}{16}$	$\frac{7}{16}$	4 × 4 × $\frac{9}{16}$	4 × 4 × $\frac{8}{16}$	$3\frac{1}{2} \times 3\frac{1}{2} \times \frac{8}{16}$

No. 2, White Lion Court, Cornhill, London, E.C.,
26th April, 1883.

TABLE G 5.

Showing diameters and spacing of Rivets and breadths of Str

Thickness of PLATES							
Diameter of RIVETS							
Breadth of TREBLE riveted STRAPS							
" " DOUBLE " "							
" " DOUBLE " LAPS							
" " SINGLE " "							
MAXIMUM Spacing of Rivets from centre to centre....	in BUTTS of outside plating						
	in EDGES " "						
	in FRAMES						

Minimum number of Rivets in edges of Plating between Fram

DIAMETER OF RIVETS.....							
Spacing of FRAMES .....20 ins.							
" " " .....21 "							
" " " .....22 "							
" " " .....23 "							
" " " .....24 "							
" " " .....26 "							

Suggested Sizes and Scantlings for Masts and Bowsprits of Sailing Vessels and Full-rigged Steam Vessels.

Iron Masts.

	Length.	Partners. Diameter.	Partners. Thickness.	Heel. Diameter.	Heel. Thickness.	Hounds. Diameter.	Hounds. Thickness.	Head. Diameter.	Head. Thickness.	Sizes of Angle Irons in Masts.	Cheeks. Thickness of Plate.	Cheeks. Sizes of Angle Iron.
Two Plates in the Round.	48	17	5/16	13	4/16	13 1/2	4/16	11 1/2	3/16	...	7/16	3 1/2 × 2 1/2 × 6/16
	51	18	5/16	13 1/2	4/16	14	4/16	12	4/16	...	7/16	3 1/2 × 3 × 6/16
	54	19	5/16	14	4/16	15	4/16	13	4/16	...	7/16	3 1/2 × 3 × 6/16
	57	20	6/16	15	5/16	16	5/16	13 1/2	4/16	...	8/16	4 × 3 × 7/16
	60	21	6/16	16	5/16	17	5/16	14	5/16	...	8/16	4 × 3 × 7/16
	63	22	6/16	16 1/2	5/16	18	5/16	15	5/16	...	8/16	4 × 3 × 7/16
Three Plates in the Round.	66	23	6/16	17	5/16	18 1/2	5/16	15 1/2	5/16	...	8/16	4 1/2 × 3 × 7/16
	69	24 1/2	6/16	18	5/16	19	5/16	16	5/16	...	8/16	4 1/2 × 3 × 8/16
	72	26	6/16	19	5/16	20	5/16	17	5/16	...	8/16	4 1/2 × 3 × 8/16
	75	27	7/16	19 1/2	6/16	21	6/16	17 1/2	6/16	...	9/16	5 × 3 × 8/16
	78	28	7/16	20	6/16	22	6/16	18	6/16	...	9/16	5 × 3 × 9/16
	81	29	8/16	21	6/16	22 1/2	6/16	19	6/16	...	9/16	5 × 3 1/2 × 9/16
	84	30	8/16	22	6/16	23	6/16	19 1/2	6/16	3 1/2 × 3 × 7/16	10/16	5 × 3 1/2 × 9/16
	87	31	8/16	22 1/2	6/16	24	6/16	20	6/16	4 × 3 × 7/16	10/16	5 1/2 × 4 × 10/16
Four Plates in the Round.	90	32	8/16	23	7/16	25	7/16	21	6/16	4 × 3 × 7/16	10/16	6 × 4 × 10/16
	93	33	9/16	24	7/16	26	7/16	21 1/2	6/16	4 × 3 × 8/16	11/16	6 × 4 × 10/16
	96	34	9/16	25	7/16	26 1/2	7/16	22	6/16	4 1/2 × 3 × 8/16	11/16	6 × 4 × 10/16

Iron Bowsprits.

Length outside Bed.	Bed. Diameter.	Bed. Thickness.	Heel. Diameter.	Heel. Thickness.	Cap. Diameter.	Cap. Thickness.	Sizes of Angle Irons.
14	17 1/2	5/16	14 1/2	5/16	12	4/16	2 1/2 × 2 × 5/16
15	18 1/2	5/16	15 1/2	5/16	12 1/2	5/16	2 1/2 × 2 × 5/16
16	20	5/16	16 1/2	5/16	13	5/16	3 × 2 × 5/16
17	21 1/2	6/16	18	6/16	14	5/16	3 × 2 × 5/16
18	23	6/16	19	6/16	15	5/16	3 × 2 1/2 × 5/16
19	24 1/2	6/16	20	6/16	16	5/16	3 × 3 × 6/16
20	26	7/16	21	6/16	16 1/2	6/16	3 1/2 × 3 × 6/16
21	27	7/16	22	6/16	17 1/2	6/16	3 1/2 × 3 × 6/16
22	28	7/16	23	6/16	18 1/2	6/16	4 × 3 × 7/16
23	30	8/16	24	7/16	19	6/16	4 × 3 1/2 × 7/16
24	31	8/16	25	7/16	20	6/16	4 × 3 1/2 × 7/16
25	32	8/16	26	7/16	21	6/16	4 1/2 × 3 1/2 × 8/16
26	33	8/16	27	7/16	21 1/2	6/16	4 1/2 × 3 1/2 × 8/16
27	35	8/16	28	7/16	22	6/16	4 1/2 × 3 1/2 × 8/16

Suggestions for the Construction of Iron Masts, Bowsprits, and Yards.—The Iron used in the construction of masts, bowsprits, and yards, should be of a good malleable quality and quite free from surface or other defects. The iron should stand a tensile strain of 20 tons to the square inch, and should be capable of standing the following bending tests when cold without fracture:—

Thickness of Plates.	To Bend Cold through an Angle of	
	With the Grain.	Across the Grain.
9/16	25°	8°
8/16	30°	11°
7/16	37°	13°
6/16	47°	15°
5/16	55°	17°
4/16	65°	20°
3/16	70°	25°

The plates to be bent over a slab, the corner of which should be rounded with a radius of half an inch.

Lower Masts.—The plating should be of the thickness, and the plates arranged as suggested in the Table. The seams should be double riveted. The butts below the mast partners in masts, and those inside the wedging of bowsprits, might be double riveted, the remainder should be treble riveted. The butt straps in all cases should be 1/16 of an inch thicker than the plates they connect, and would be better to be fitted on the outside of the masts and bowsprit. The mast and bowsprit plates should be doubled in way of the wedging, or otherwise efficiently strengthened. The heels of all masts and their steps should be efficiently strengthened. The cheeks of masts should be stiffened by angle irons or cope iron on their foremost edges; or by some other approved plan.

Where two plates in the round are allowed instead of three, the iron should be of such superior quality as to admit of its being bent to the required form, without being unduly heated, to a fair curve and without fracture, and in all such cases the masts should be stiffened by three angle-irons as provided for in the Suggested Tables.

All masts of 84 feet length and above, to be fitted with angle irons properly shifted and extending the whole length of the mast. If the plates be arranged as described in the Tables, there should be an angle iron fitted to each plate in the round, of the size given in the Table.

All bowsprits exceeding 28 inches in diameter should have a vertical diaphragm plate extending from within the wedging to the gammoning, connected by continuous single angle irons to the upper and lower parts of the bowsprit, and two additional angle irons of the size given in the Table; and bowsprits 28 inches in diameter and under, to have an angle iron at the centre of each plate extending the whole length of the bowsprit.

Sketches of steel masts, bowsprits, and yards to be submitted for the approval of the Committee.

The attention of the Surveyors is to be especially directed to the fitments connected with the masts and rigging, in order to ensure the workmanship, material, and sizes of the same being efficient.

Where a Steamer is intended to be fitted with masts or a bowsprit for auxiliary purposes, they may be one-eighth less in diameter than prescribed by Table.

The mizenmasts for barques may be reduced one-fifth in diameter from that given in the Table, and the plating to be not less than the thickness corresponding to the diameters.

Lloyd's Register of British & Foreign Shipping, 2, *White Lion Court, London.*—15th August, 1878.

Suggested Sizes and Scantlings for Yards and Topmasts of Sailing Vessels and Full rigged Steam Vessels.

IRON YARDS.

Length.	Centre.		1st Quarter.		2nd Quarter.		3rd Quarter.		Ends.	
	Diameter.	Thickness.	Diameter.	Thickness.	Diameter.	Thickness.	Diameter.	Thickness.	Diameter.	Thickness.
32	8	3/16	7 7/8	3/16	7 1/4	3/16	6	3/16	4	2/16
36	9	3/16	8 3/4	3/16	8 1/8	3/16	6 3/4	3/16	4 1/2	2/16
40	10	3/16	9 3/4	3/16	9	3/16	7 1/2	3/16	5	2/16
44	11	3/16	10 3/4	3/16	10	3/16	8 1/4	3/16	5 1/2	2/16
48	12	4/16	11 3/4	4/16	10 3/4	3/16	9	3/16	6	2/16
52	13	4/16	12 5/8	4/16	11 3/4	3/16	9 3/4	3/16	6 1/2	2/16
56	14	4/16	13 5/8	4/16	12 5/8	4/16	10 1/2	3/16	7	2/16
60	15	4/16	14 5/8	4/16	13 1/2	4/16	11 1/4	3/16	7 1/2	2/16
64	16	5/16	15 5/8	5/16	14 3/8	5/16	12	4/16	8	3/16
68	17	5/16	16 1/2	5/16	15 1/4	5/16	12 3/4	4/16	8 1/2	3/16
72	18	5/16	17 1/2	5/16	16 1/4	5/16	13 1/2	4/16	9	3/16
76	19	6/16	18 1/2	5/16	17 1/8	5/16	14 1/4	4/16	9 1/2	3/16
80	20	6/16	19 1/2	5/16	18	5/16	15	4/16	10	3/16
84	21	7/16	20 1/2	6/16	19	5/16	15 3/4	5/16	10 1/2	4/16
88	22	7/16	21 1/2	6/16	19 3/4	5/16	16 1/2	5/16	11	4/16
92	23	7/16	22 1/2	6/16	20 3/4	6/16	17 1/4	5/16	11 1/2	4/16
96	24	7/16	23 3/8	6/16	21 5/8	6/16	18	5/16	12	4/16

IRON TOPMASTS.

Length.	Heel.		Lower Part of Head.		Head.	
	Diameter.	Thickness.	Diameter.	Thickness.	Diameter.	Thickness.
32	11 1/2	3/16	7 1/4	3/16	6 1/2	2/16
34	12	3/16	8	3/16	7	2/16
36	12 1/2	4/16	9	4/16	7 1/2	3/16
38	13 1/2	4/16	10	4/16	8	3/16
40	14 1/2	4/16	11	4/16	9	3/16
42	15	4/16	11 1/2	4/16	9 1/2	3/16
44	15 1/2	4/16	12	4/16	10 1/2	3/16
46	16	5/16	13	4/16	11	4/16
48	17	5/16	14	4/16	11 1/2	4/16
50	17 1/2	5/16	15	4/16	12 1/2	4/16
52	18	6/16	15 1/2	5/16	13	5/16
54	18 1/2	6/16	16	5/16	13 1/2	5/16
56	19 1/2	6/16	16 1/2	5/16	14	5/16
58	20	6/16	17	5/16	15	5/16
60	20 1/2	6/16	18	5/16	15 1/2	5/16
62	21 1/2	6/16	18 1/2	5/16	16	5/16
64	22	6/16	19 1/2	5/16	17	5/16

Topmasts.—The plating should be of the thickness given in the Table. The seams of topmasts may be single riveted; the butts should be treble riveted, and their straps 1/16 of an inch thicker than the plates they connect. There should be doubling plates in the way of the lower mast cap Topmasts should be efficiently strengthened in the way of the fid holes and in the way of sheave holes where such are cut, by the doubling plates, iron hoops, or by other approved methods.

Lower Yards. — The plating should be of the thickness given in the Table. The seams of yards may be single riveted; their butts should be treble riveted, and connected by being overlapped, or by efficient butt straps. The plates should be doubled at the centre, and the doubling plates should extend beyond the truss hoops.

Where iron masts and yards are to be constructed otherwise than in accordance with the Tables plans and particulars of the same must be submitted for the approval of the Committee.

Where Steamers are intended to be fitted with topmasts for auxiliary purposes, they might be one-eighth less in diameter than prescribed by Table.

Lloyd's Register of British and Foreign Shipping, 2, White Lion Court, London.—24th May, 1877.

Suggested Sizes and Scantlings for Yards and Topmasts of Sailing Vessels.

Full Rigged Steam Vessels.

Length.	Iron Yards.										Iron Topmasts.					
	Centre.		1st Quarter.		2nd Quarter.		3rd Quarter.		Ends.		Heel.		Lower Part of Head.		Head.	
	Diameter.	Thickness.	Diameter.	Thickness.	Diameter.	Thickness.	Diameter.	Thickness.	Diameter.	Thickness.	Diameter.	Thickness.	Diameter.	Thickness.	Diameter.	Thickness.
32	8	1/16	7 1/8	1/16	7 1/4	1/16	6	1/16	4	1/16	32	11 1/2	1/16	7 1/4	1/16	6 1/2
36	9	1/16	8 1/4	1/16	8 1/8	1/16	6 3/4	1/16	4 1/2	1/16	34	12	1/16	8	1/16	7
40	10	1/16	9 1/2	1/16	9	1/16	7 1/2	1/16	5	1/16	36	12 1/2	1/16	9	1/16	7 1/2
44	11	1/16	10 1/4	1/16	10	1/16	8 1/4	1/16	5 1/2	1/16	38	13 1/2	1/16	10	1/16	8
48	12	1/16	11 1/2	1/16	10 1/2	1/16	9	1/16	6	1/16	40	14 1/2	1/16	11	1/16	9
52	13	1/16	12 1/2	1/16	11 1/2	1/16	9 1/2	1/16	6 1/2	1/16	42	15	1/16	11 1/2	1/16	9 1/2
56	14	1/16	13 1/2	1/16	12 1/2	1/16	10 1/2	1/16	7	1/16	44	15 1/2	1/16	12	1/16	10 1/2
60	15	1/16	14 1/2	1/16	13 1/2	1/16	11 1/4	1/16	7 1/2	1/16	46	16	1/16	13	1/16	11
64	16	1/16	15 1/2	1/16	14 1/2	1/16	12	1/16	8	1/16	48	17	1/16	14	1/16	11 1/2
68	17	1/16	16 1/2	1/16	15 1/4	1/16	12 1/2	1/16	8 1/2	1/16	50	17 1/2	1/16	15	1/16	12 1/2
72	18	1/16	17 1/2	1/16	16 1/4	1/16	13 1/2	1/16	9	1/16	52	18	1/16	15 1/2	1/16	13
76	19	1/16	18 1/2	1/16	17 1/4	1/16	14 1/4	1/16	9 1/2	1/16	54	18 1/2	1/16	16	1/16	13 1/2
80	20	1/16	19 1/2	1/16	18	1/16	15	1/16	10	1/16	56	19 1/2	1/16	16 1/2	1/16	14
84	21	1/16	20 1/2	1/16	19	1/16	15 3/4	1/16	10 1/2	1/16	58	20	1/16	17	1/16	15
88	22	1/16	21 1/2	1/16	19 3/4	1/16	16 1/2	1/16	11	1/16	60	20 1/2	1/16	18	1/16	15 1/2
92	23	1/16	22 1/2	1/16	20 3/4	1/16	17 1/4	1/16	11 1/2	1/16	62	21 1/2	1/16	18 1/2	1/16	16
96	24	1/16	23 3/4	1/16	21 3/4	1/16	18	1/16	12	1/16	64	22	1/16	19 1/2	1/16	17

Lloyd's Register of British and Foreign Shipping, 2, White Lion Court, London.—

Suggested Table of Sizes for the Iron Wire Standing Rigging, &c., of Sailing Ships.

Register Tonnage under Deck.	Tons. 1,800 to 2,000.		Tons. 1,600 to 1,800.		Tons. 1,400 to 1,600.		Tons. 1,200 to 1,400.		Tons. 1,000 to 1,200.		Tons. 800 to 1,000.		Tons. 700 to 800.		Tons. 600 to 700.		Tons. 500 to 600.		Tons. 400 to 500.		Tons. 300 to 400.	
	No.	Size. Inches.	No.	Size. Inches.	No.	Size. Inches	No.	Size. Inches.	No.	Size. Inches.	No.	Size. Inches	No.	Size. Inches	No.	Size. Inches	No.	Size. Inches.	No.	Size. Inches	No.	Size. Inches
Fore & Main Shrouds ...	6 and cap	$5\frac{1}{2}$	6 and cap	$5\frac{1}{4}$	6 and cap	5	6 and cap	$4\frac{3}{4}$	6 and cap	$4\frac{1}{2}$	5 and cap	$4\frac{1}{4}$	5 and cap	4	5 and cap	$3\frac{3}{4}$	5	$3\frac{1}{2}$	4	$3\frac{1}{4}$	4	3
,, ,, Chain plates		$2\frac{1}{4}$		$2\frac{1}{8}$		2		$1\frac{7}{8}$		$1\frac{3}{4}$		$1\frac{3}{4}$		$1\frac{5}{8}$		$1\frac{5}{8}$		$1\frac{1}{2}$		$1\frac{1}{2}$		$1\frac{1}{2}$
,, ,, Dead-eyes ...		12×7		$11\frac{1}{2}\times6\frac{1}{2}$		11×6		$10\frac{1}{2}\times6$		10×6		$9\frac{1}{2}\times5\frac{1}{2}$		$9\times5\frac{1}{2}$		$8\frac{1}{2}\times5$		8×5		$7\frac{1}{2}\times4\frac{1}{2}$		$7\times4\frac{1}{2}$
,, ,, Lanyards (hemp)		6		$5\frac{3}{4}$		$5\frac{1}{2}$		$5\frac{1}{4}$		5		$4\frac{3}{4}$		$4\frac{1}{2}$		$4\frac{1}{4}$		4		$3\frac{3}{4}$		$3\frac{1}{2}$
,, ,, Topmst. bckstys.	3	$5\frac{1}{2}$	3	$5\frac{1}{4}$	3	5	3	$4\frac{3}{4}$	3	$4\frac{1}{2}$	2	$4\frac{1}{4}$	2	4	2	$3\frac{3}{4}$	2	$3\frac{1}{2}$	2	$3\frac{1}{4}$	2	3
,, ,, Top-gllt. bckstys	2	4	2	$3\frac{3}{4}$	2	$3\frac{1}{2}$	2	$3\frac{1}{4}$	2	$3\frac{1}{8}$	2	3		$2\frac{3}{4}$		$2\frac{5}{8}$		$2\frac{1}{2}$		$2\frac{1}{4}$		2
,, ,, Lower stays ...	2	$5\frac{1}{2}$	2	$5\frac{1}{4}$	2	5	2	$4\frac{3}{4}$	2	$4\frac{1}{2}$	2	$4\frac{1}{4}$	2	4	2	$3\frac{3}{4}$	2	$3\frac{1}{2}$	2	$3\frac{1}{4}$	2	3
,, ,, Topmast stays	2	$5\frac{1}{2}$	2	$5\frac{1}{4}$	2	5	2	$4\frac{3}{4}$	2	$4\frac{1}{2}$	2	$4\frac{1}{4}$	2	4		$3\frac{3}{4}$		$3\frac{1}{2}$		$3\frac{1}{4}$		3
,, ,, Top-gallant stays		4		$3\frac{3}{4}$		$3\frac{1}{2}$		$3\frac{1}{4}$		$3\frac{1}{8}$		3		$2\frac{3}{4}$		$2\frac{5}{8}$		$2\frac{1}{2}$		$2\frac{1}{4}$		2
Mizen Shrouds	5 and cap	$4\frac{1}{2}$	5 and cap	$4\frac{1}{4}$	5 and cap	4	5 and cap	$3\frac{3}{4}$	5	$3\frac{1}{2}$	5	$3\frac{3}{8}$	5	$3\frac{1}{4}$	4	$3\frac{1}{8}$	4	3	3	$2\frac{7}{8}$	3	$2\frac{3}{4}$
,, Topmast backstays ...	3	$4\frac{1}{2}$	3	$4\frac{1}{4}$	3	4	3	$3\frac{3}{4}$	3	$3\frac{1}{2}$	2	$3\frac{3}{8}$	2	$3\frac{1}{4}$	2	$3\frac{1}{8}$		3		$2\frac{7}{8}$		$2\frac{3}{4}$
,, Top-gallant backstays	2	$3\frac{1}{4}$	2	3	2	$2\frac{3}{4}$	2	$2\frac{1}{2}$	2	$2\frac{1}{4}$		$2\frac{1}{8}$		2		2		$1\frac{3}{4}$		$1\frac{1}{2}$		$1\frac{1}{2}$
,, Lower stays ...	2	$4\frac{1}{2}$	2	$4\frac{1}{4}$	2	4	2	$3\frac{3}{4}$	2	$3\frac{1}{2}$		$3\frac{3}{8}$		$3\frac{1}{4}$		$3\frac{1}{8}$		3		$2\frac{7}{8}$		$2\frac{3}{4}$
,, Topmast stays ...	2	$4\frac{1}{2}$	2	$4\frac{1}{4}$	2	4	2	$3\frac{3}{4}$		$3\frac{1}{2}$		$3\frac{3}{8}$		$3\frac{1}{4}$		$3\frac{1}{8}$		3		$2\frac{7}{8}$		$2\frac{3}{4}$
,, Top-gallant stays		$3\frac{1}{4}$		3		$2\frac{3}{4}$		$2\frac{1}{2}$		$2\frac{1}{4}$		$2\frac{1}{8}$		2		2		$1\frac{3}{4}$		$1\frac{1}{2}$		$1\frac{1}{2}$
Bobstay Bar		$3\frac{3}{4}$		$3\frac{5}{8}$		$3\frac{1}{2}$		$3\frac{1}{4}$		3		$2\frac{1}{2}$		$2\frac{1}{4}$		2		2		2		2
,, Pin ...		$2\frac{3}{4}$		$2\frac{5}{8}$		$2\frac{1}{2}$		$2\frac{1}{4}$		$2\frac{1}{8}$		$1\frac{7}{8}$		$1\frac{5}{8}$		$1\frac{1}{2}$		$1\frac{1}{2}$		$1\frac{1}{2}$		$1\frac{1}{2}$
,, Chain		$1\frac{14}{16}$		$1\frac{13}{16}$		$1\frac{12}{16}$		$1\frac{10}{16}$		$1\frac{8}{16}$		$1\frac{6}{16}$		$1\frac{5}{16}$		$1\frac{4}{16}$		$1\frac{4}{16}$		$1\frac{4}{16}$		$1\frac{3}{16}$
Bowsprit Shrouds ...	2	1	2	1	2	$\frac{7}{8}$	2	$\frac{7}{8}$	2	$\frac{13}{16}$	2	$\frac{12}{16}$		$\frac{12}{16}$		$\frac{11}{16}$		$\frac{10}{16}$		$\frac{9}{16}$		$\frac{9}{16}$

1.—The above requirements are intended to apply to vessels in which the dimensions of the masts and yards are such as would not be deemed unusual for vessels of the respective tonnages; where these dimensions are extreme, or where four masts are adopted instead of three, or in other exceptional cases where deviations from the above sizes are required, rigging plans showing the sizes and arrangements of the several parts should be submitted for the approval of the Committee.

2.—Where screws are fitted for the purpose of setting up the shrouds and backstays, a sketch of the same showing the dimensions of the several parts is to be submitted.

3.—Where it is proposed to adopt steel wire rigging, the following sizes are suggested in lieu of iron wire ropes for the same parts:—

	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.
Iron ..	$5\frac{1}{2}$	$5\frac{1}{4}$	5	$4\frac{3}{4}$	$4\frac{1}{2}$	$4\frac{1}{4}$	4	$3\frac{3}{4}$	$3\frac{1}{2}$	$3\frac{1}{4}$	3
Steel ..	$4\frac{3}{4}$	$4\frac{1}{2}$	$4\frac{1}{4}$	$4\frac{1}{8}$	4	$3\frac{3}{4}$	$3\frac{1}{2}$	$3\frac{1}{4}$	3	$2\frac{3}{4}$	$2\frac{1}{2}$

But in each case application must be made in the first place for the approval of the Committee, stating particulars of the manufacture and quality of the steel wire ropes proposed, and the tests which they are guaranteed to withstand.

4.—Where double top-gallant yards are to be adopted, a topmast cap backstay should be fitted.

Lloyd's Register of British and Foreign Shipping, 2, *White Lion Court, London.*—24th May, 1877.

Suggested Table of Sizes for the Iron Wire Standing Rigging of Steamers.

	Tons. 1,800 to 2,000.		Tons. 1,600 to 1,800.		Tons. 1,400 to 1,600.		Tons. 1,200 to 1,400.		Tons. 1,000 to 1,200.	
	No.	Size. Inches.	No.	Size. Inches.	No.	Size. Inches.	No.	Size. Inches.	No.	Size. Inches.
Fore & Main Shrouds ...	6 and cap	5¼	6 and cap	5¼	6 and cap	5	6	4½	6 and cap	4½
,, ,, Chain plates		2¼		2		2		1½		1¾
,, ,, Dead-eyes ...	12×7		11½×6½		11×6		10½×6		10×6	
,, ,, Lanyards (hemp)		6		5¾		5½		5¼		5
,, ,, Topmast backstays	3	5½	3	5¼	3	5	3	4¾	3	4½
,, ,, Top-gallt. backstays	2	4	2	3¾	2	3½	2	3¼	2	3¼
,, ,, Lower stays ...	2	5½	2	5¼	2	5	2	4¾	2	4½
,, ,, Topmast stays	2	5½	2	5¼	2	5	2	4¾	2	4½
,, ,, Top-gallant stays		4		3¾		3½		3¼		3⅛
Mizen Shrouds ...	5 and cap	4½	5 and cap	4¼	5 and cap	4	5	3¾	5 and cap	3½
,, Topmast backstays ...	3	4½	3	4¼	3	4	3	3¾	3	3½
,, Top-gallant backstays	2	3¼	2	3	2	2¾	2	2½	2	2¼
,, Lower stays ...	2	4½	2	4¼	2	4	2	3¾	2	3½
,, Topmast stays ...	2	4½	2	4¼	2	4	2	3¾	2	3½
,, Top-gallant stays		3¼		3		2¾		2½		2¼
Bowsprit Shrouds ...	2	1	2	1	2	1⅛	2	1⅛	2	1¼
Bonstay Bar		3⅜		3⅛		2⅞		2¾		2⅝
,, Pin ...		2⅝		2½		2⅜		2¼		2⅛
,, Chain		1⅝		1½		1⅜		1⅛		1⅛

1.—The above requirements are intended to apply to vessels in which the dimensions of the masts are proportionate to their tonnages; where these dimensions are extreme, or where four masts are adopted instead of three, or in other exceptional cases, plans showing the sizes and arrangements of the several parts should be submitted for the approval of the Committee.

2.—Where screws are fitted for the purpose of setting up the shrouds and backstays, a sketch of the same should be submitted.

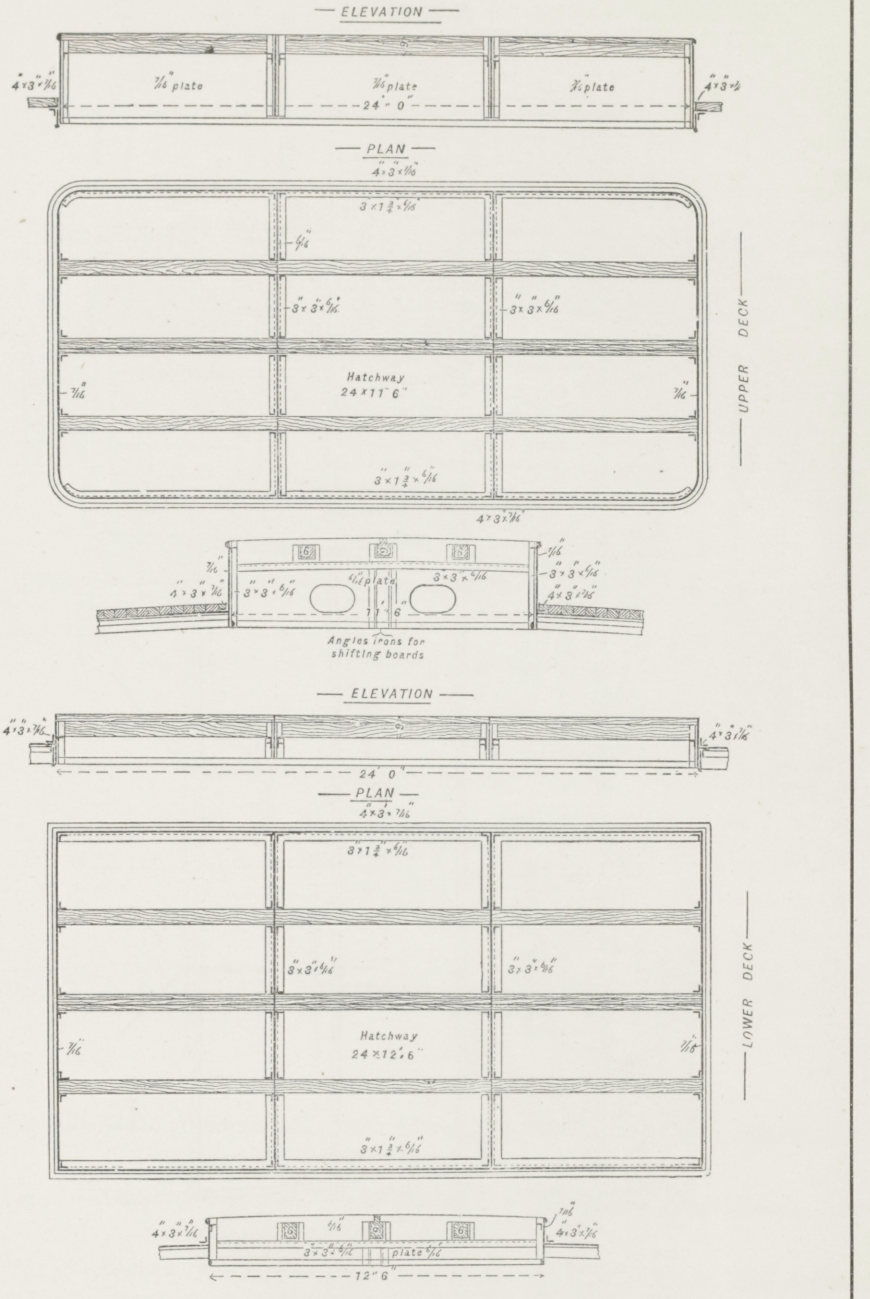
3.—Where it is proposed to adopt steel wire rigging, the following sizes are suggested in lieu of iron wire:—

	Tons. 1,800 to 2,000.			Tons. 1,600 to 1,800.			Tons. 1,400 to 1,600.			Tons. 1,200 to 1,400.			Tons. 1,000 to 1,200.		
	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.
Iron ...	5½	5¼	5	4¾	4½	4¼	4	3¾	3½	3	2¾	2½	2¼	2	1¾
Steel ...	4½	4¼	4	3¾	3½	3¼	3	2¾	2½	2¼	2	1¾	1½	1¼	1

But in each case application should be made to the Committee for the consideration of particulars of the manufacture, and the strength guaranteed to withstand.

4.—Where double top-gallant stays are fitted, the sizes may be reduced by one number.

Lloyd's Register of British and Foreign Shipping, 71, Mark Lane, London.



Sketch showing arrangement of Shifting Beams in Cargo Hatchways.

Sketch showing arrangement of Shifting Beams in Cargo Hatchways.

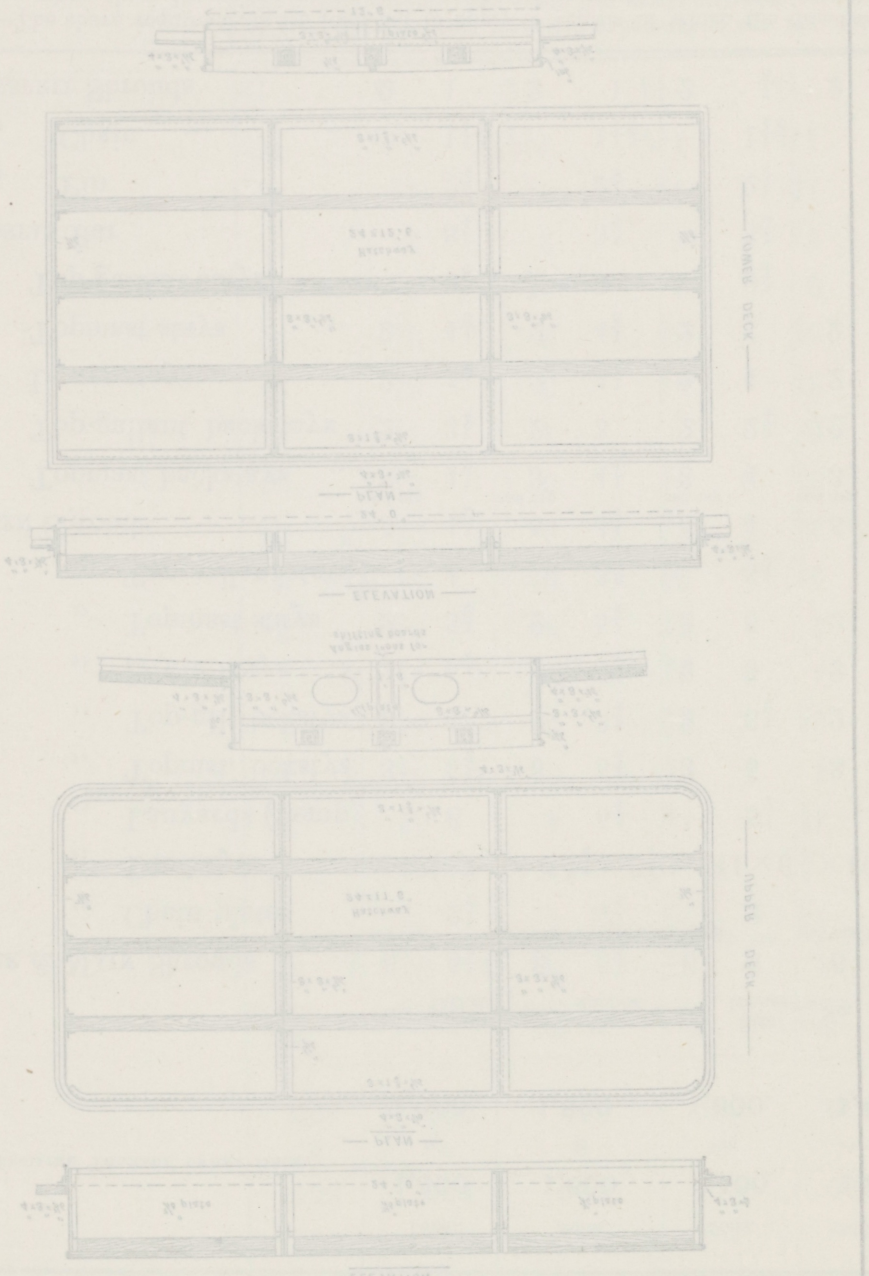


FIG. 1.

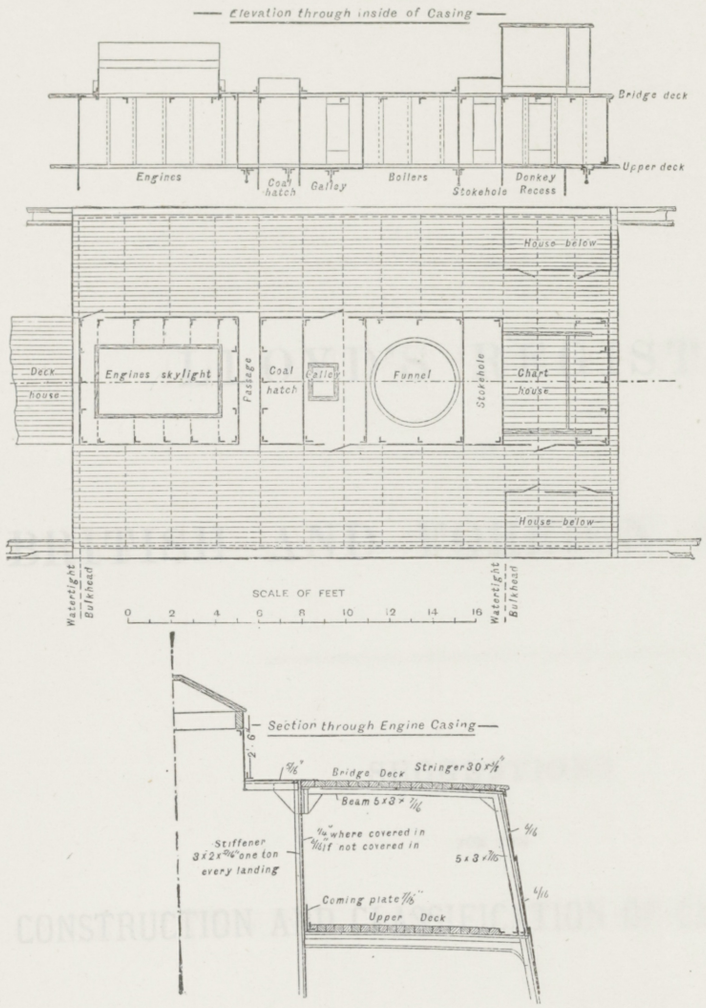


FIG 2.

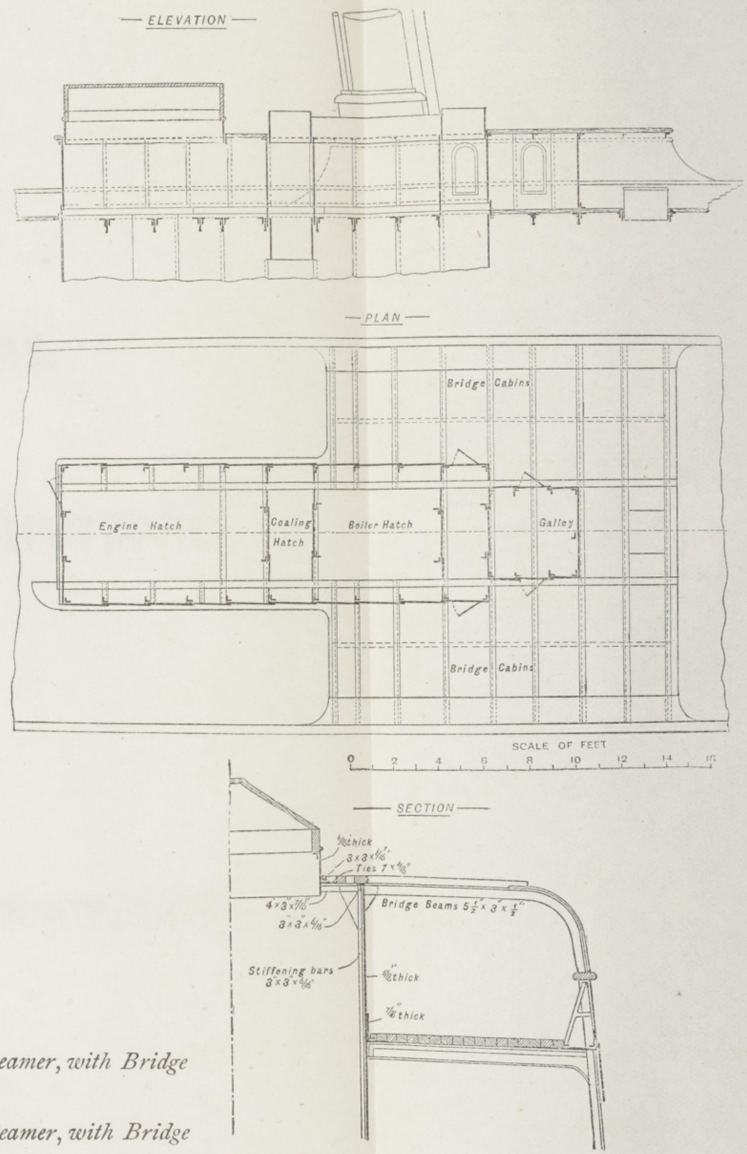


FIG. 3.

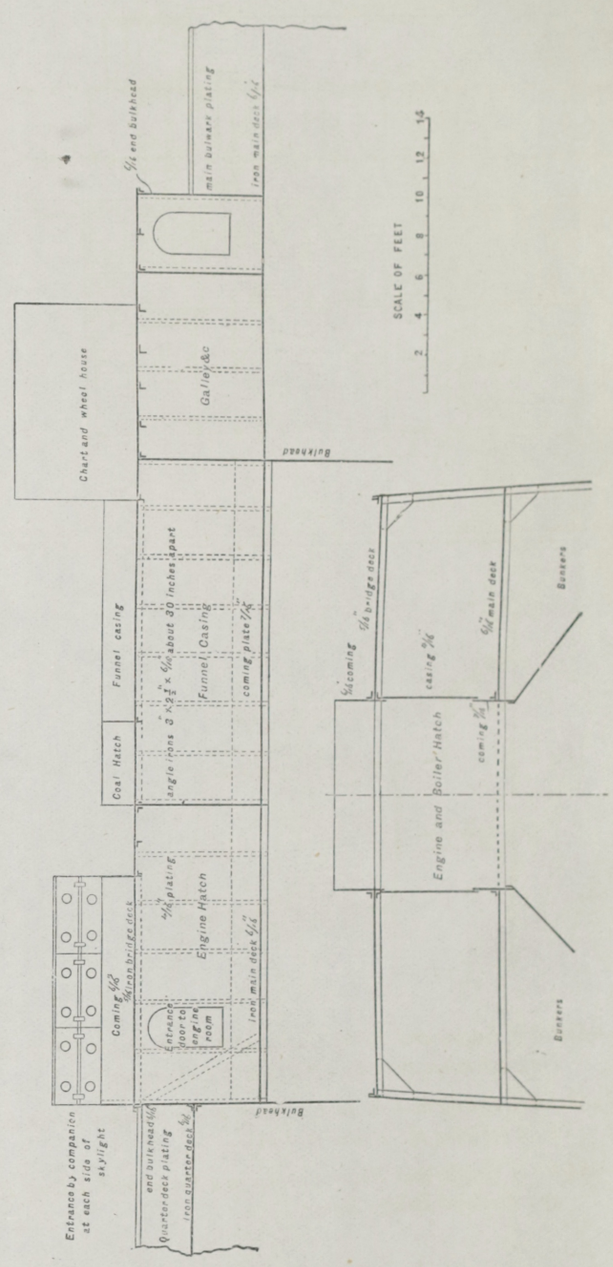


Fig. 1.—*Sketch of Engine and Boiler Casing of a Three-decked Cargo Steamer, with Bridge Deck extending the whole length of the Openings.*

Fig. 2.—*Sketch of Engine and Boiler Casing of a Three-decked Cargo Steamer, with Bridge Deck covering the Boiler Hatchway.*

Fig. 3.—*Sketch of Engine and Boiler Casings in a Vessel with a Long Raised Quarter Deck and Enclosed Bridge House.*

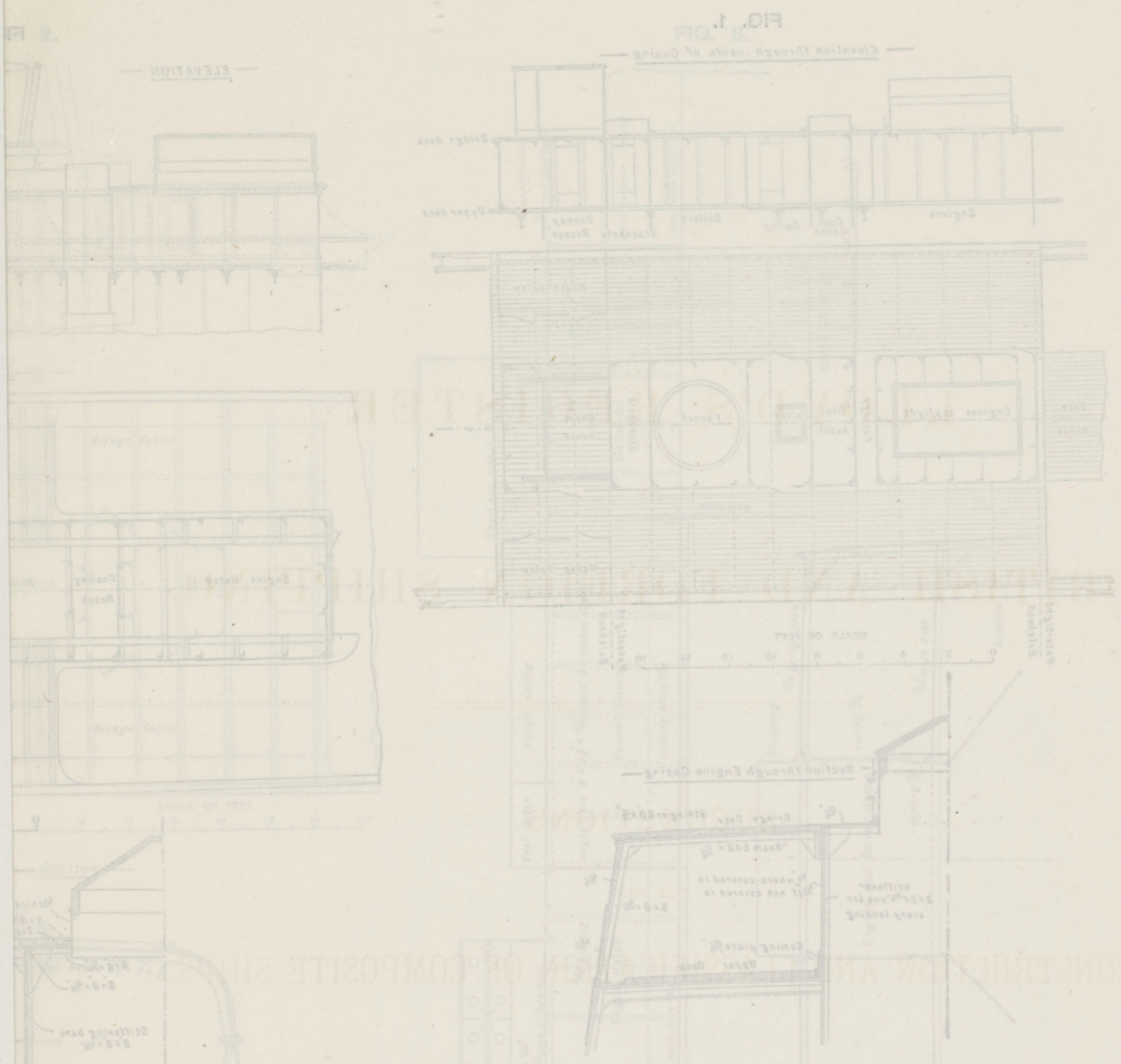


Fig. 1.—Sketch of Engine and Boiler Casing of a Three-decked Cargo Steamer, with Bridge Deck extending the whole length of the Openings.

Fig. 2.—Sketch of Engine and Boiler Casing of a Three-decked Cargo Steamer, with Bridge Deck covering the Boiler Hatchway.

Fig. 3.—Sketch of Engine and Boiler Casings in a Vessel with a Long Raised Quarter Deck and Enclosed Bridge House.

LLOYD'S REGISTER

OF

BRITISH AND FOREIGN SHIPPING.

SUGGESTIONS

FOR THE

CONSTRUCTION AND CLASSIFICATION OF COMPOSITE SHIPS.

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SUGGESTIONS

FOR

THE CONSTRUCTION AND CLASSIFICATION

OF

COMPOSITE SHIPS.

All vessels constructed with iron frames, or part iron and wood frames, and wood planking, to be classed A for a term of years,* according to the timber material used in their construction, as set forth in Table I, provided the workmanship be well executed, subject to the surveys and conditions hereinafter stated.†

VESSELS BUILT UNDER A ROOF.

An additional year will be allowed to vessels built under a substantial and efficient roof, kept in good repair, and which extends on each side beyond the vessel's breadth, and beyond each of her ends to an extent equal to half her midship breadth.

COPPER OR YELLOW METAL BOLTS.

Paragraph No. 1. Two additional years will be allowed to vessels, whether planked with one or two thicknesses, if fastened with wrought copper or yellow metal bolts, from the lower part of keel up to the height of one-fifth of the midship depth of hold, below the upper side of the upper deck and parallel thereto forward and aft, in one, two, or three-decked ships, and below the upper side of the main or tonnage deck in spar-decked ships, but the whole of the fastenings above this height may be of iron, if properly galvanized, and dowelled or cemented over.

Such ships to be marked C. F. (*Copper fastened*).

Paragraph No. 2. Three additional years will be allowed, provided the whole of the external fastenings from the lower part of keel to the gunwale be of wrought copper or yellow metal bolts, to the entire exclusion of iron.

Such ships to be marked **C.F.** (*Copper fastened*).

IRON BOLTS AND GALVANIZED IRON BOLTS.

Vessels will be allowed to be fastened with galvanized or plain iron bolts, if efficiently dowelled or cemented over; but the butt bolts, and also those which are used in fastening the fore hood ends before the iron

* The terms of years assigned to *Composite Ships* on the Character A will expire on the 31st December of the last year of the periods assigned to them.

† *Expunging or withdrawal of Character.—The twelfth, thirteenth, and fourteenth Columns left blank, indicate that the Vessel has never been classed in the Register Book. Three dots ... in Column* 13 *indicate that the Vessel was at one time Classed by this Society, but that the Class has been withdrawn at owner's request. A black line with date under it in Column* 14 *indicates that, at that date, the Vessel,* from reported defects, *was not entitled to a Character in the Register Book. A red line with date under it in this Column indicates that the Class was withdrawn from non-compliance, at that date, with the Society's Rules.*

stem plate, the after hood ends abaft the sternpost plate, extending from the keel up to the height of one-fifth the depth of hold below the upper side of the upper deck, in one, two, or three-decked vessels, or below the upper side of the main or tonnage deck in spar-decked vessels, those which fasten the planking to the dead-wood, the lower edge of the garboard strakes, and the wood keel, and stem scarphs, must be of wrought copper or yellow metal.

All vessels fastened with galvanized iron to be marked G. I. B. (*Galvanized Iron Bolts*), and with plain iron bolts (I. B.); and in addition all Iron-fastened Ships will be marked "*Expl. T. S.*" (*Experimental Triennial Survey*).

All vessels fastened with galvanized or plain iron bolts in the bottom, previous to being sheathed with copper or yellow metal, must be sheathed with wood not less than $1\frac{1}{4}$*in. thick, wrought hot on the best hair felt, and properly rabbeted into the stem, sternpost, keel, and into the planking at its upper edge; efficiently fastened to the bottom planks with yellow metal or copper nails, arranged to come between the frames, and be well caulked. The condition of the bolts and caulking of the bottom and planking to be ascertained at the periodical Surveys as per* Section 43. *The wood sheathing to be allowed to remain on the bottom as long as the bottom planks, bolts, and caulking prove satisfactory.*

SURVEYS WHILE BUILDING.

SPECIAL SURVEY.

Section 1. The Surveyors are to examine the whole of the materials and the workmanship as it progresses, from the laying of the keel to the completion of the vessel, and to point out as early as possible anything that may be objectionable.

In steam vessels built under Special Survey, the Machinery and Boilers must also be constructed under Special Survey.

COMMON SURVEY.

Section 2. First.—Examination of the wood keel, stem, sternpost, deadwood, and frames before they are painted or coated.

Second.—Of all the beams, stringers, plates, &c., when in place, riveted-up ready to receive the planking.

Third.—When the vessel is planked outside, dubbed fair, and all the fastenings completed, but before she is either caulked, coated, or cemented, so that the inside and outside of the planking, and the bolts and their nuts, may be carefully examined.

Fourth.—When the vessel is caulked, but before the bolt-heads are cemented or have dowels fitted over them.

Fifth.—When the vessel is completed, launched, and equipped.

SUGGESTIONS AS TO THE BUILDING OF COMPOSITE SHIPS.

QUALITY OF IRON, MAKER'S NAME, AND WORKMANSHIP.

Section 3. The whole of the iron to be of good malleable quality, to be capable of bearing a longitudinal strain of twenty tons per square inch, and all plate, beam, and angle iron, to be legibly stamped in not less than two places with the manufacturer's trade-mark, or his name, and the place where made, which is also to be stated in the Report of survey.

Any brittle or inferior iron, defective planking, timber, or other objectionable materials to be rejected.

The workmanship to be well executed, and submitted to the closest inspection before coating or painting.

RIVETS AND RIVETING.

Section 4. The rivets to be of the best quality, and to be of the diameter as per Table H, the rivet holes to be regularly and equally spaced, and carefully punched opposite each other in the adjoining parts from the faying services in the laps, lining pieces, butt-straps, and frames, and to be countersunk where required; the rivets not to be nearer to the butts or edges of the plating, lining pieces to butts, or of any angle iron, than a space equal to their own diameter, and not to be further apart from centre to centre than five times their diameter, or nearer than four times their diameter from centre to centre, and to be spaced through the frames and outside plating, and in reversed angle iron a distance equal to nine times their diameter from centre to centre.

All butts of iron plating, excepting those of poops and top-gallant forecastles, to be at least double riveted, and a space equal to twice the diameter of the rivets to be between each row; where treble riveting is adopted, a space equal to twice the diameter of the rivet to be between each row, with half the number of rivets in the back row.

SCANTLINGS.

Section 5. The scantlings given in Table H are intended for ships the length of which, measured from the fore part of stem to the after part of the sternpost, on the range of the upper deck, does not exceed ten times their depth of hold, taken from the upper part of the floors to the top of the upper deck beams, or seven times their moulded breadth.

In vessels exceeding ten depths, or seven breadths in length, the builders are to submit their plans for giving them additional longitudinal strength to the Committee, through the Resident Surveyors, who are to express their opinions thereon.

The depth for defining the proportions of spar-decked vessels is to be measured from the top of the floor-plates to the upper side of the middle or tonnage deck beams. (*See* Section 24.)

WOOD KEEL.

Section 6. The wood keel to be of the dimensions set forth in Table H, to be free from all defects, the scarphs to be either vertical or horizontal, and to be tabled, the width of the tabling to be one-third the siding or moulding of the keel, as the case may be, and from $\frac{3}{4}$ of an inch to $1\frac{1}{4}$ inch deep, according to the size of the keel, and bolted with copper or yellow metal bolts, which are to be driven on and clenched on rings of the same metal; the bolts are to be in size and number as required by Table K.

GARBOARD STRAKE.

Section 7. The garboard strakes not to be less than two-thirds the depth of keel prescribed in Table H, and properly rabbeted into it, to be fitted closely to the iron keel plate, and to be of sufficient width. The butts of the garboard strake to have not less than four feet six inches shift from the butts of the garboard strake on the opposite side of the vessel, nor less than the same shift clear of the keel scarphs. (For bolting, *see* Section 33.)

STEM AND STERNPOST.

Section 8. The stem and sternpost to be of the dimensions set forth in Table H, and of materials according to class as prescribed in Table I. Where necessary to scarph the stem, it must be a flat scarph, and its length not less than seven-tenths of that prescribed in Table K for keel scarphs, and tabled and bolted in the same manner. The hood ends to be well and efficiently rabbeted into the stem and sternpost.

APRON, INNER STERNPOST, AND DEADWOOD.

Section 9. The apron, inner sternpost, and deadwood, to be of materials according to class as prescribed in Table I; the apron and inner sternpost to be of sufficient siding and moulding for the knight-heads and counter timbers respectively, to be secured to them, and to take the hood end fastenings.

SPACING OF IRON FRAMES.

Section 10. The spacing of the iron frames not to exceed 18 inches from moulding edge to moulding edge all fore and aft; a four feet length of angle iron, the size of the frame, is to be riveted to each floor and to the keel plate, back to back with the frame.

KEEL PLATE.

Section 11. The keel plate to be of the breadth and thickness prescribed in Table H, and to be made continuous up the apron and up the inner sternpost as high as practicable, but in all cases to extend above the lower deck or hold beam stringer angle iron. Forward and aft the plate is to be curved to the form of the bearding line, and to be one-sixteenth of an inch thicker than prescribed in the Table, where it passes over the deadwoods, apron, and inner sternpost; and to be sided as required by the form of the vessel, to have an angle iron of the size given in Table H for stringer angle irons riveted on each edge, flanged to the form of the vessel to receive the plank fastenings. The keel plate to maintain its breadth for three-fifths the length of the keel in midships, and then to be gradually reduced until its edges conform with the flange of the angle iron on the keel plate forward and aft; the butts of the keel plates to be shifted clear of the keel scarphs.

FRAMES.

Section 12. The frames to be of the dimensions set forth in Table H, and the narrow flange to be of a parallel thickness, and the bolts are to be so placed that the nuts of the screw bolts may fit closely to the frames; the frames to be in as long lengths as possible, fitted and riveted on to the keel plate, and extended as near to the middle line as practicable, according to the plan of construction adopted, and in all cases to extend to the gunwale, and where raised quarter decks, poops, forecastles, and spar decks are constructed to extend to their deck stringers respectively, except when constructed of a rounded form at the gunwale, then they may terminate at the lower part of the curve; if the frames be welded, the welds to be perfect with not less than four feet shifts from the welds of next frames, or, if butted, to have not less than four feet shifts with four feet lengths of angle iron of the same size as the frames, fitted back to back, riveted to them, and secured to the outside planking.

FLOOR-PLATES.

Section 13. The floor-plates to be in thickness according to Table H, but at each end of the vessel, for one quarter of her length, they may be reduced one-sixteenth of an inch where the midship floor-plates

are six-sixteenths and under ten-sixteenths of an inch, and two-sixteenths of an inch where the plates are ten-sixteenths and above in thickness.

The depth of the floor-plates at middle line to be regulated by the following rule, viz., to the vessel's depth, measured from the top of the keel to the top of the upper or spar deck beams amidships add the extreme breadth of the vessel, two-fifths of that sum in inches to be the depth of the floor-plates at the middle line well fore and aft, but at the extreme fore and after ends they must be deeper, so as to form an efficient connection between the two sides of the vessel.

The floor-plates are to extend up the bilges not less than to a perpendicular height of *twice* and *a half* the depth of floors amidships, from upper side of keel at middle line; and in no case to be less moulded in any part than a fair taper between the depth at middle line, and the moulding at their extreme ends, which is to be not less than the moulding of the frames. The ends of the floors to maintain the height prescribed amidships, for one quarter of the vessel's length; they may then be gradually lowered forward and aft until the upper edges of the floor-plates are level, which place is to be determined by the form of the vessel, and from that point to the vessel's ends they are to be gradually increased in depth, so as to efficiently connect the sides of the vessel; the upper parts of the floors forward and aft are to be high enough to give ample room between the reverse frames on each side of the vessel for fitting the keelson angle irons.

In vessels having considerable rise of floor, the depth of the floor-plates on a square at the quarter of the vessel's extreme moulded breadth, set out from the middle line, is to be not less than three-fifths the depth of the floor-plate at the middle line, and the floor-plate is to be extended up the bilges by a fair taper from middle line, until it terminates at the moulding of the frames.

A floor-plate to be fitted and riveted to every frame and to be extended across the middle line, but, where a vertical centre plate is adopted at middle line, then the floor-plates are to be efficiently connected to it on each side by double vertical angle irons of not less size than the reversed frames.

When floors extend from side to side, and are made in two lengths, the butts are to have double butt-straps, one on each side of the floor-plates, and three-fourths the thickness of the floor-plates, or else the floor-plates must be lapped and treble riveted.

WATERCOURSES.

Section 14. Watercourses are to be formed through all the floor-plates, on each side of the middle line, and at the bilges above the frames, so as to allow water to reach the pumps freely, and also through the vertical centre plate, and intercostal keelsons when such keelsons are adopted.

REVERSED FRAMES.

Section 15. Reversed angle irons on frames to be in size as per Table H. All vessels under 200 tons to have reversed angle iron riveted to every frame and floor-plate across the middle line, extended to the height of the upper part of the bilge, and to the gunwale on alternate frames, and to have double reversed angle irons in way of all keelsons and stringers in hold; and in addition all vessels of 200 tons and upwards to have reversed angle iron extended to the upper deck beam stringer on alternate frames, and, where raised quarter decks and spar decks are constructed, to their deck stringers respectively, except when constructed of a rounded form at the gunwale, then they may terminate at the lower part of the curve; and on the

remaining frames reversed angle irons are to be fitted to above the height of the lower deck or hold beam stringer angle iron if the vessel has two decks or tiers of beams, and to above the height of the middle deck beam stringer angle iron if the vessel has three decks or tiers of beams; the rivets for securing the reversed angle iron to the frames and floor-plates to be in diameter as specified in Table H, and be spaced not to exceed a distance of nine times their own diameter from centre to centre; butts of reversed angle iron to be secured with butt-straps.

MIDDLE LINE KEELSON.

Section 16. The middle line keelson, if of single plate, and standing above the floor-plates, to be of the thickness prescribed in Table H, to be two-thirds of the depth of floor-plates, and to have an angle iron, of the size given in Table H, fitted and riveted on *each* side, top and bottom, extending all fore and aft, the bottom angle irons to be riveted to a foundation plate the breadth of which is to be not less than three and a half times the flange of the angle iron fitted upon it, and the top angle irons to a rider plate on the top, the breadth of which is to be not less than the breadths of the flanges of the angle irons attached to them and the thickness of the keelson plates combined, to be properly shifted, and to be of the thickness given in Table H for box keelson plates, and the lower plates to be riveted to double reversed angle irons attached to each of the floors; but the foundation plate may be dispensed with if the combined widths of the horizontal flanges of the bottom angle irons are equal to the breadth prescribed for the foundation plate, and double riveted to the angle irons on the floors.

BOX KEELSON.

If a box keelson be adopted, it is to be formed of plates, properly shifted, of the thickness given in Table H, with a foundation plate, the depth of the box to be not less than two-thirds the depth of the floor-plates, and the breadth of it two-thirds of its depth; the lower angle irons of the box keelson to be of the size given for the frames, and the top ones the size of the reversed frames, and the keelson to be well stayed in way of the masts.

INTERCOSTAL KEELSON.

If an intercostal keelson be adopted, it is to be of the thickness prescribed in Table H, and riveted to vertical angle irons of not less size than the reversed frames attached to all floor-plates, the plates to extend from the keel plate to the top of the floors, a bulb plate of not less thickness than the lower deck beams, or other bars of equal strength, to be let down below the top of the floors sufficiently for the intercostal plates to be riveted to them; in all cases these bars are to be fitted between two longitudinal angle irons on the floors, extending all fore and aft, of the size given for keelson angle iron in Table H, and riveted thereto. The intercostal plates to be fitted close to the floors, and to the flat keel plate.

VERTICAL CENTRE PLATE.

If the middle line keelson be formed of a vertical centre plate, extending from the keel plate to the top of the floors, it must be not less in thickness than that given in Table H, riveted to two fore and aft angle irons of the size given for stringer angle irons in Table H, attached to the keel plate. To strengthen the floor-plates transversely at their intersection at the middle line, in addition to double vertical angle irons, of not less size than the reversed frames, riveted to their ends, and to the vertical centre plate, there is to be a flat keelson plate of the same breadth and thickness as the keel plate, riveted to double reversed angle irons on the upper

edge of floors, and to two fore and aft angle irons of the size given for stringer angle irons in Table H, on the top edge of the vertical centre plate; but, should the vertical centre plate be extended above the upper edge of the floors, then it is to be riveted to two fore and aft angle irons of the size given in Table H, for stringer angle irons, and to *two* flat plates of the thickness given for box keelson plates, and half the breadth of the keel plates, one on each side of the middle line, which are to be well riveted to double reversed angle irons on the top of each floor, one of these reversed angle irons to reeve through the vertical centre plate, and in all cases the vertical centre plate to be extended to the stem and sternpost plates, and riveted thereto.

BILGE KEELSONS AND STRINGERS.

Section 17. All vessels to have bilge keelsons fitted and riveted to double reversed angle irons to each floor, secured in an efficient manner, and to extend all fore and aft, and placed at the lower turn of the bilges according to the form of the bottom; to be formed of double angle irons of the size given in Table H, with bulb plate not less than the size given for hold beams, fitted between them for one-half the length of the vessel in midships; and in addition, in vessels of 300 tons and under 700 tons, a stringer will be required between the bilge keelson and hold beams, formed of double angle irons back to back, well riveted to double reversed angle irons and to each other; at the fore and after ends of the vessel the bilge keelson and stringer angle irons to be efficiently connected by plates forming hooks and crutches, which are to be properly riveted to the apron and inner sternpost plates; and such vessels to have intercostal plates fitted midway between the main and bilge keelsons, for three-fifths the vessel's length of keel in midships, these plates to be the thickness of the floor-plates, and connected thereto with angle irons of the size of the reversed frames.

In vessels of 700 tons and under 1,000 tons, in addition to the foregoing, a bulb plate, not less in thickness than the hold beams, is to be let down and riveted to the side intercostal plates, to be inserted between double angle irons on the top of the floors of the size given for stringer angle irons in Table H, and to be extended for three-fifths the length of the keel in midships, but the double angle irons to extend as far forward and aft as practicable.

In vessels of 1,000 tons and upwards, of a depth not requiring orlop beams, in addition to the foregoing, another stringer must be introduced formed of double angle irons fitted back to back to extend fore and aft, and riveted to double reversed angle irons and to each other; this stringer and the one below it are to be arranged so as to be equally spaced between the bilge keelson and hold beams, and a foundation plate, of the same thickness as the floors, is to be fitted for three-fifths the vessel's length of keel amidships under the bilge keelson, to be riveted to double reversed frames to the floors, and to which the bilge keelson is to be riveted. The breadth of the foundation plate is not to be less than three and a half times the flange of the angle iron fitted upon it.

Where bulb iron is used for keelsons or stringers, the joins to be overlapped and riveted; the length of the overlap must not be less than the depth of the bulb plate, but iron of other form than bulb may be used for them if of equal strength.

All angle irons for keelsons and stringers are to be in as long lengths as possible, properly shifted, and wherever butted to be connected with angle iron or plate iron not less than two feet long, fitted in the throat of them, properly riveted to each flange, and the thickness of the connecting plates not to be less than the angle irons they connect.

SPACING OF BEAMS.

Section 18. The spacing of the upper deck beams in no case to exceed 4 feet 6 inches from centre to centre.

Vessels of 11 feet depth of hold and under, to have a stringer formed of double angle irons back to back, of the size given in Table H, placed midway between the bilge keelson and deck beams, fitted and riveted to reversed angle iron attached to each frame, to extend all fore and aft, and connected by plates at the ends forming hook and crutch, which are to be secured to the apron and inner sternpost.

Vessels over 11 and under 13 feet depth of hold to have a hold beam stringer plate of the same thickness as the upper deck stringer plate, but only two-thirds its breadth, efficiently secured to the side by an angle iron riveted to it and to the reversed frames of the size given in Table H for stringer angle iron, to extend all fore and aft, and to be properly connected at the fore and after ends. Bracket or knee plates to be fitted and riveted to the stringers at alternate frames on the under side, and the inner edge of the stringer plate to be stiffened by an angle iron of the same size as given for the reversed angle iron on the frames; or, if preferred, a stringer may be formed of bulb plate of the size given for hold beams fitted between two stringer angle irons, passing all fore and aft, properly riveted to double reversed angle iron on the frames, and to each other, or a stringer may be introduced of any other form of equal strength.

Vessels of 13 feet and under 15 feet depth of hold to have a hold beam under every alternate upper deck beam.

Vessels of 15 feet depth of hold and under 18 feet to have hold or lower deck beams spaced not more than 4 feet 6 inches, and 9 feet from centre to centre alternately, and always to be placed under upper deck beams.

And, in vessels of 18 feet depth of hold and above, a hold or lower deck beam to be placed under every upper deck beam.

PANTING (TO PREVENT).

In vessels exceeding 12 feet in depth from the lower side of the lower deck beams, and having fine ends, extra beams will be required both forward and aft between the lower deck beams and floors to prevent "panting," the sizes, arrangement, and security of them to be to the satisfaction of the Surveyors.

TWO-DECKED VESSELS WITH ORLOP BEAMS.

All two-decked vessels exceeding 24 feet in depth from the top of the floors to the upper side of the upper deck beams, and three-decked vessels exceeding 24 feet to the upper side of the middle deck beams, and where the depth from the under side of the lower deck beams exceeds 15 feet, such vessels to have orlop beams under every second lower deck beam with a stringer plate on their ends, of the same breadth and thickness as the lower deck stringer, passing all fore and aft, supported by brackets riveted to every other frame between the beams; the orlop beams to be secured to lugs welded to the lower deck beam pillars; but, in the case of flush-deck ships, a depth of 25 feet will be allowed, provided the lower hold does not exceed 16 feet in depth from the under side of lower deck beams. Should a house be constructed on such flush-deck ship, for lodging crew or for store room, the same not to extend within 10 feet of the sternpost.

THREE-DECKED VESSELS.

In vessels having three decks, viz., upper, middle, and lower, and where cargo may be carried on the middle and lower decks, the beams, iron sheerstrake, upper deck stringers, and stringer angle irons and flat of upper deck are to bear the same proportion to the vessel's dimensions as in those having two decks, and the middle and lower deck beams, and stringers, are to be of the same size in proportion to the vessel's length and breadth, as they would be in the lower deck of a vessel having only two decks; but one-sixth reduction will be allowed in the thickness of the outside planking, for one-fifth of the depth of hold below the upper deck stringer.

In all cases the middle deck is to be perfectly laid and caulked.

BEAMS.

Section 19. Beams to be of bulb plate with double angle irons on the top edge, or of T bulb iron, or of any other approved form of equal strength.

The upper deck beams to be one quarter of an inch in depth to every foot in length of the midship beam, and to be in thickness one-sixteenth of an inch for every inch in depth, with one-sixteenth of an inch added; if of T bulb, the united breadth of the top flanges to be not less than three-fourths the depth of the beam, and, where beams are formed of bulb plate with double angle irons on the top edge, the flanges of each of the angle irons are not to be less in their united breadth than three-fourths the depth of the beam, and to be one-sixteenth of an inch in thickness for every inch of the two sides of the angle iron.

MIDDLE-DECK, HOLD, AND ORLOP BEAMS.

Middle-deck, hold, and orlop beams to be one-eighth of the depth deeper, and one-sixteenth of an inch thicker than the upper deck beams.

All beams to be efficiently connected to the frames by bracket ends, or knee plates, the arms of each to be not less than twice and a half the depth of the beams in length, and of not less thickness than the beams.

PILLARS.

Section 20. All beams for at least three-quarters the length of the vessel in midships to be pillared, and in addition, the beams under the bowsprit, pall bitt, windlass, and capstan are to be pillared; the pillars to have not less than two rivets in each of their ends, so as to form a continuous tie from the keelson to the upper deck, or spar deck, and to be of the sizes given in Table H.

ENGINE-ROOM AND BOILER SPACE.

Section 21. In the construction of steam vessels, care must be taken that the engine and boiler bearers are properly constructed, and where they might interfere with the longitudinal strength of the vessel they must be extended a sufficient distance beyond the engine and boiler space to compensate for such interruption; and, after the machinery and boilers are fitted, as many hold or lower deck beams are to be introduced as may be practicable, and knee or bracket plates are to be added and riveted to the stringer plates, and to alternate frames which have no beams in the said space, and the vessel is to be otherwise made secure where necessary in the engine room, to the satisfaction of the Surveyors.

RAISED QUARTER-DECKS.

Section 22. The frames in all cases, and reversed angle iron on alternate frames, where practicable, are to extend to the raised quarter-deck stringer.

A reduction of one-half in the breadth and one-fifth in the thickness will be allowed for the sheerstrake of the raised quarter deck, and one-fifth in the scantlings, of the beams, stringers, stringer angle iron, and flat of deck of raised quarter deck, from that given in Table H for the upper deck of such ships; one-fifth reduction will also be allowed for the outside planking, or plating, of the raised quarter deck from that given for topsides in Table H.

The upper deck beam stringer plate is to maintain its breadth to the break of the quarter deck, and then it may be gradually reduced in breadth until it terminates at the sixth frame abaft the break, and the upper deck sheerstrake plate is to extend to the stern.

POOPS AND FORECASTLES.

Section 23. In full poops and top-gallant forecastles, the frames are to be extended to their stringer plates; a reduction of one-fourth will be allowed from the dimensions required by Table H for the upper deck sheerstrake, stringer plate, angle iron on stringers, beams, and flat of deck; the same reduction will be allowed for the outside planking, or plating, of the poop or forecastle, from the thickness given for topsides in Table H; where plating alone is adopted, it need not in any case exceed six-sixteenths of an inch in thickness, and may be single riveted. An iron or wood spirketting to be fitted and efficiently secured and caulked in the poop and forecastle, to prevent water from going into the 'tween decks. The united lengths of poop and forecastle not to exceed three-fifths of the entire length of the upper deck.

Where the poop or the forecastle is constructed of a rounded form at the gunwale, the frames need not extend beyond the lower part of the curve, and the beams may be of plain angle iron not less in dimensions than the size required in Table H for the main frames, one to be placed to every alternate frame, to scarph the main frames with not less than two-feet lengths and be properly riveted to them; the breast beams are not to be less in size than the angle iron for stringers prescribed in Table H, with an angle iron of the size of the reversed frames riveted to them, and the rounded gunwale when not intended to be planked over, its plating must be of the thickness required for sheerstrakes of poops; but, when intended to be planked over, the thickness prescribed for the stringer plates on beams of poops will be sufficient; in either case the plating must extend the breadth of the rounded form, and in such cases stringers on beam ends will not be required.

TONNAGE, HAVING REFERENCE TO SCANTLINGS, &c.

In flush-decked vessels having either one, two, or three decks (not being spar or awning decked), the tonnage under the upper deck, *without abatement of the tonnage of the space for the crew, or for the propelling power of steam vessels*, is to regulate all the scantlings of the hull and also the equipment of the vessel.

In vessels having a *raised quarter deck*, or a poop, or top-gallant forecastle, or deck houses, or awning deck, or spar deck, the total tonnage below the tonnage deck is to regulate the scantlings of the hull; but the register tonnage, as cut on the main beam of sailing vessels and of steam vessels, *with the addition of the*

tonnage of the space required for propelling power, is to regulate the equipment, and also the size of the main piece of rudder and windlass, and the keel and keelsons and their number, and the scantling of the stringer plates on the upper and lower deck beams, and the requirements as to double riveting.

But, in vessels where the tonnage of the erections above the tonnage deck is less than that required for crew space, *then* the *difference* between the tonnage of these erections and the tonnage of the space allowed for crew is to be *added* to the register tonnage, cut on the main beam, for the tonnage that is to regulate the equipment and the size of the main piece of rudder and windlass, and the keel and keelsons and their number, the scantling of the stringer plates on the upper and lower deck beams, and the requirements for double riveting.

SPAR-DECKED VESSELS.

Section 24. A spar-decked vessel is one having three decks or tiers of beams, where the space between the main and the spar deck is to be used only for the accommodation of crew and passengers, or to enclose the engine openings of steam vessels. The total depth of such vessels, measured from the top of floor-plates to the top of spar deck beams in midships, must not exceed thirteen-sixteenths, nor be less than twelve-sixteenths of the ship's extreme breadth. All frames and reverse angle irons on alternate frames are to extend to the spar deck stringer plate, except when constructed with a rounded form at the gunwale, then they may terminate at the lower part of the curve, but the reverse angle irons on the remaining frames are required to extend above the height of the main deck waterway or spirketting; in such ships the gross tonnage below the main or tonnage deck is to regulate all scantlings below this deck, but the total tonnage is to regulate the scantlings of the keelsons and their number, the stringers in the hold, the size of the main piece of rudder, and windlass.

These vessels are to have a main or middle complete deck, perfectly laid and caulked, and a main or middle deck iron sheerstrake, each of the thickness prescribed by Table H, and the main deck stringer plate is to be fitted and connected to the iron sheerstrake by angle iron between the frames of the size given for stringers, and in addition an inner stringer angle iron passing continuously fore and aft must be riveted to the reversed frames and to the main deck stringer plate. The upper part of the sheerstrake is to be not less in height than the main deck waterway or spirketting, as the case may be, and the space between the waterway, or spirketting, and the sheerstrake, all fore and aft, is to be filled in and made water-tight.

In such vessels a reduction of one-fourth from the dimensions required by Table H for the corresponding parts in the range of the upper deck in ships with two decks will be allowed from the dimensions of all beams, stringers, thickness of deck, and the outside planking, or plating, from the main deck upwards. If plating alone be adopted between the main and spar decks, the thickness need not exceed six-sixteenths of an inch in any case, the butts to be *double* riveted, but the edges may be single riveted.

When the spar deck is constructed of a rounded form at the gunwale, the beams may be of plain angle iron, if fitted to alternate frames, not less in dimensions than the sizes required in Table H for the main frames, to scarph the main frames with not less than two-feet lengths, and be properly riveted to them. All hatchway and mast beams are to be of increased strength, and if of plain angle iron not to be less than the sizes given for stringer angle irons in Table H, with other angle irons of the size of the reversed frames riveted to them back to back. The rounded gunwale to be plated and properly constructed to the satisfaction of the Surveyor.

DECK HOUSES.

Deck houses or other erections will be allowed on a spar deck, but only to the extent of one-tenth its total superficial area; they are not to exceed seven feet in height, nor be placed nearer to either end of the vessel than one-fifth of her extreme length.

Vessels to which the Rule applies as regards an entire spar deck, will be noted in the Register Book thus, "*Spar dk.*"

EQUIPMENT.

The tonnage, as per Section 32 of Rules for Wood Ships, is to regulate the equipment. (*See* Sections 72 to 78 of the Rules for Wood Ships, *also* Table No. 22.)

The boilers and machinery are to be considered as part of the equipment, and, unless the Surveyors are satisfied of their efficiency, the figure 1 will be withheld, and it is to be understood that, although, for facilities in contracting, a class, to which the hull of a vessel may be found entitled, will be assigned, the class will not be inserted in the Register Book unless the engines and boilers have been surveyed in accordance with the requirements of the Rules.

STEAM SHIPS.—BOILERS AND MACHINERY.

In new vessels propelled by steam, and in vessels fitted with new engines or boilers, the machinery is to be submitted to the inspection of the Society's Engineer-Surveyors, who will furnish a report to the Committee describing them, in the manner and form, No. 8 annexed. The Committee will thereupon, if found satisfactory, grant a certificate, and insert in the Register Book the notification, "L.MC." *in red* (*i.e.* LLOYD'S MACHINERY CERTIFICATE), indicating that the machinery and boilers are certified to be in good order and safe working condition.

If the machinery or boilers are Specially Surveyed during their construction, a distinguishing mark ✠ in red is added, thus: "✠L.MC.," or "✠N.E.&B.82," or "✠N.B.82."

In order to facilitate this inspection, the plans of the *machinery and boilers* should be examined, and from them the working pressure fixed.

In cases where it is proposed to construct boilers of steel for classed vessels, or vessels intended for classification, the material is required to fulfil the following conditions (*see* Circular, No. 438*, page 122):—

1. The material is to have an ultimate tensile strength of not less than 26 and not more than 30 tons per square inch of section,* with an ultimate elongation of not less than 20 per cent. in a length of eight inches. It is to be capable of being bent to a curve of which the inner radius is not greater than one and a half time the thickness of the plates or bars, after having been heated uniformly to a low cherry-red and quenched in water of 82° Fahrenheit.
2. Steel rivets are to be considered as part of the material, and, in addition to being subjected to a shearing test, they must be capable of withstanding the same tests as the plates are required to undergo.
3. Samples for testing are to be selected from each batch of plates submitted for approval, care

* Steel of a less tensile strength than 26 tons per square inch, if satisfactory in other respects, may be allowed in any case where the scantlings are equal to those prescribed in the Rules for iron boilers. In such cases the Surveyors should represent the facts for the Committee's consideration.

being taken in the selection that, as far as possible, each cast or furnace charge from which the material has been produced is represented. In addition to these tests, the temper test is to be applied to samples taken from *every* plate intended to be used in the furnaces and combustion chambers of the boilers.

4. All the holes in steel boilers should be drilled, but if they be punched the plates are to be afterwards annealed.
5. All plates that are dished or flanged, or in any way heated in the fire for working, except those that are subjected to a compressive stress only, are to be annealed after the operations are completed.
6. No steel stays are to be welded.
7. Unless otherwise specified, the Rules for the construction of iron boilers will apply equally to boilers made of steel.

The Surveyors will be guided in fixing the working pressure by the *tables and formulæ* annexed.

Any novelty in the construction of the machinery or boilers to be reported to the Committee.

The boilers, together with the machinery, to be inspected at different stages of construction.

The boilers to be tested by hydraulic pressure, in the presence of the Engineer-Surveyor, to twice the working pressure, and carefully gauged while under test.

Two safety valves to be fitted to each boiler and loaded to the working pressure in the presence of the Surveyor. If common valves are used, their combined areas to be at least half a square inch to each square foot of grate surface. If improved valves are used, they are to be tested under steam in the presence of the Surveyor, the accumulation in no case to exceed 10 per cent. of the working pressure.

An approved safety valve also to be fitted to the superheater.

In winch boilers one safety valve will be allowed, provided its area be not less than half a square inch per square foot of grate surface.

Each valve to be arranged so that no extra load can be added when steam is up, and to be fitted with easing gear which must lift the valve itself. All safety valve spindles to extend through the covers and be fitted with sockets and cross handles, allowing them to be lifted and turned round in their seats, and their efficiency tested at any time.

Stop-valves to be fitted so that each boiler can be worked separately.

Each boiler to be fitted with a separate steam gauge, to accurately indicate the pressure.

Each boiler to be fitted with a blow-off cock independent of that communicating with the sea.

The machinery and boilers are to be securely fixed to the vessel to the satisfaction of the Surveyors.

Gauges of an approved description for testing the truth of the crank shafts are to be supplied with all new engines, and adjusted in the presence of the Surveyor.

The engines are to be fitted with two feed pumps each capable of supplying the boilers; the pumps, &c., to be so arranged that either can be overhauled whilst the other is at work.

The engines are to be fitted with two bilge pumps, which are to be so arranged that either can be overhauled whilst the other is at work.

In engines of 70 H.P. and under, one feed pump and one bilge pump will be deemed sufficient provided they are of adequate capacity.

A bilge injection or a bilge suction to the circulating pump is to be fitted.

Engine bilge pumps are to be so fitted as to pump from each compartment of the vessel. The roses in engine-room and mud boxes to be placed in positions where they are easily accessible, and to be to the satisfaction of the Surveyors.

A donkey pump is to be provided capable of supplying the boilers with water. A donkey is to be so fitted as to pump from each compartment, to deliver water on deck, and, if no hand pump is fitted in engine-room, it must be fitted to be worked by hand.

All steam and feed pipes are to be of copper, of a thickness to the satisfaction of the Surveyors.

All discharge pipes to be, if possible, carried above the deep load-line, and to have discharge-valves fitted *in an accessible position.*

No pipes to be carried through the bunkers without being properly protected.

Bilge suction pipes to be arranged to pump direct from each compartment, the roses to be fixed in places where they can be easily accessible.

COCKS, PIPES, AND SEA CONNECTIONS.

With a view to ensuring better control over cocks, valves, and pipes connecting the engines and boilers with the sea, they are to be fixed as follows, in all new vessels and in vessels having new engines or boilers, viz. :—

All sea-cocks to be attached to Kingston valves of a height sufficient to lift them up to the level of platforms.

Cocks and valves connecting all suction pipes to be fixed above the stoke-hold and engine-room platforms.

The arrangement of pumps, bilge injections, suction and delivery pipes, to be such as will not permit of water being run from the sea into the vessel by an act of carelessness or neglect. Any defective arrangement to be reported to the Committee.

SPARE GEAR.

The articles of spare gear mentioned in the following list will be required to be carried in all steam vessels classed in the Society's Register Book, viz. :—

2 connecting-rod top-end bolts and nuts,
2 connecting-rod bottom-end bolts and nuts,
2 main-bearing bolts,
1 set of coupling bolts,
1 set of feed and bilge pump valves,
1 set of piston springs (where common springs are used),
A quantity of assorted bolts and nuts,
Iron of various sizes.

In addition to the foregoing, the following articles are recommended to be carried with a view to expedite repairs and lessen delay in distant ports, viz. :—

Crank shaft.
Propeller shaft.
Propeller, or a full set of blades,
Stern-bush, or lignum-vitæ lining for bush,
Air pump rod,
Circulating pump rod,
H. P. valve spindle,
L. P. valve spindle,
1 set of check valves,
1 pair of connecting rod brasses,
1 pair of cross-head brasses,
1 set of link brasses,
1 cylinder escape valve and spring,
1 eccentric strip complete,
6 junk ring bolts,
6 cylinder cover bolts,
4 valve chest cover bolts,
2 dozen boiler tubes,
3 dozen condenser tubes,
1 set of safety valve springs.

PERIODICAL INSPECTION OF MACHINERY. (*See* N.B. at foot.)

The machinery and boilers of all steam ships are to be surveyed annually if practicable, and, in addition, to be submitted to a Special Survey every four years upon the occasion of the vessels undergoing the Special periodical Surveys prescribed in the Rules, and the boilers to Special Survey when six years old, and subsequently to annual Survey.

At these Special Surveys the propeller, stern-bush, and fastenings of the sea connections are to be examined while the vessel is in dry dock, and, if deemed necessary by the Surveyor, the stern shaft is to be drawn and examined.

The cylinders, pistons, side valves, crank shaft, and pumps are to be examined, and if necessary the condenser is to be examined and tested.

The boilers and superheaters are to be examined, and if deemed necessary by the Surveyors are to be drilled or tested by hydraulic pressure; the safe working pressure is to be determined by their actual condition.

The safety valves are to be examined and set to the safe working pressure.

The sea connection and arrangements of cocks, pipes, bilge suctions, roses, &c., are to be examined.

If satisfactory, these surveys will be recorded in the Register Book thus:—"L.MC. 5,82" *in red;* "B.&M.S. 5,82" *in red.*

"L.MC." (LLOYD'S MACHINERY CERTIFICATE) with a date, denotes that the machinery and boilers are fitted in accordance with the Rules, and were found upon examination at that time to be in good condition.

"B.&MS." (BOILERS and MACHINERY SURVEYED), with a date, denotes that the boilers and machinery, though not fitted strictly in accordance with the Rules, were found upon inspection at that time to be in good condition.

"B.S." (BOILERS SURVEYED), with a date, denotes that the boilers were found upon inspection at that time to be in good condition.

In the event of either the machinery or boilers appearing to be impaired to such an extent as renders it desirable that either or both be specially surveyed within the periods prescribed above, a certificate for either machinery or boilers for a limited period will be granted according to the nature of the case.

IRON SHEERSTRAKE.

Section 25. The iron sheerstrake to be one inch in breadth for every six feet of the vessel's length for half her length in midships, and to be of the thickness given in Table H; it may then be gradually reduced in breadth and in thickness to three-fourths of the midship breadth and thickness at her ends.

The butts of the iron sheerstrake in all cases to be shifted clear of the butts of the stringer plates on the beam ends, the shift in no case to be less than equal to three spaces of frames, and all plates where practicable to be not less than nine feet long, but if the sheerstrake plates are eighteen feet long they may be

N.B.—In reference to the Rules above quoted, and in order to prevent the disappointment arising from ships losing their Characters from want of survey, it is hereby intimated that the duty of giving NOTICE OF PERIODICAL SURVEYS *required by the Rules, or when repairs are necessary in consequence of damage, or from other causes, rests with the Owners, Masters, or Agents.*

of two equal breadths, but carvel plated and single riveted; butts of all plating to be fitted quite close, and in no case is the lower edge of the iron sheerstrake to be fitted less than two-thirds of the breadth required by the Rule for sheerstrake, below the upper deck stringer plate. The butt-straps in all cases to be in one piece, whether fitted outside or inside, and in no case to be in two pieces by being cut at the stringer plate. (*See* Section 30.)

IRON BILGESTRAKE.

Section 26. The bilgestrake plates to be two-thirds the breadth of the iron sheerstrake, for three-fifths the length of the keel in midships, and from thence to the ends of the vessel they are to be reduced gradually to one-half their midship breadth; the thickness of the plates to be as prescribed in Table H, and they are to be fitted at the bilges with the middle of the plate at the height prescribed for floorheads, such position for the bilge plates to be maintained, notwithstanding that the floorheads may be carried higher. They are to be extended to the ends of the vessel in accordance with her form, and properly riveted to the frames.

DIAGONAL PLATES ON FRAMES.

Section 27. The diagonal plates on the frames to be not less than one-third the breadth of the iron sheerstrake, and fitted in pairs, transversely, all fore and aft, at an angle of 45°, with the butts of each pair meeting between the frames; to be of the thickness given in Table H, and connected to the sheer and bilgestrake plates by butt-straps, double riveted, and to be efficiently riveted to each other, and to each frame they cross.

STRINGER PLATES ON ENDS OF BEAMS.

Section 28. All vessels to have stringer plates of the thickness given in Table H upon the ends of each tier of beams. Those upon the ends of the upper deck beams of one, two, and three-decked vessels, to be in width one inch for every seven feet of the vessel's entire length, for half her length in midships, and from thence to the ends of the vessel they may be gradually reduced to three-fourths the width in midships; in no case, however, is the width in midships to be less than eighteen inches. The stringer plates are to be riveted to the beams and properly shifted, fitted home, and riveted to the iron sheerstrake, with an angle iron of the dimensions given in Table H, and the roughtree stanchions are not to pass through them. Stringer plates on the ends of beams below the upper deck may be reduced in width to three-fourths the midship breadth of the upper deck stringer, which breadth is to extend all fore and aft, and to have an angle iron of the dimensions given in Table H, extending all fore and aft, riveted to reverse angle iron on each frame and to the stringer plates.

In cases where a deck is not laid, and the width of the stringer plate on ends of hold beams is objected to, it may be reduced in width, provided such reduction be fully compensated for.

All stringer angle irons are to be in as long lengths as possible, properly shifted, and wherever butted to be connected with angle iron, or plate iron, not less than two feet long, fitted in the throat of them, properly riveted to each flange, and the thickness of the connecting plates not to be less than that of the angle iron they cover.

GUTTER WATERWAYS.

Upper deck gutter waterways are to be flooded to ascertain if there be any leakage, and when completed they are to be properly cemented.

TIE-PLATES.

Section 29. All vessels are to have tie-plates ranging all fore and aft upon each side of the hatchways on each tier of beams, and in addition thereto the beams of the upper and middle decks in three-decked or spar-decked vessels, and of the upper deck in vessels of one or two decks, must have tie-plates fitted from side to side diagonally, in number, one pair for about every thirty-five feet of the vessel's length; these plates in both cases must not be less in width than once and a half the depth of the beams of their respective decks, and of the thickness required for stringer plates; they are to be well riveted to each other and to the beams and stringers, and to have intermediate fastenings into the deck plank between the beams. In all cases their butts to be chain riveted.

Upon hold beams where a deck is not to be laid, a tie formed of double angle iron, of the size given for the main frames of the ship, may be fitted each side of the hatchways in lieu of tie-plates; but, if the beams are made of such additional strength laterally as not to require the support given by the said angle irons or tie-plates, double angle irons of the above size fitted at the centre line from opening to opening may be substituted.

HATCHWAYS AND MAST PARTNERS.

All hatchways and mast holes are to be properly framed to receive half beams where required, and the latter to have mast partners at each tier of beams (except at orlop beams), the plating of which is not to be less in thickness than is required for stringer plates, and the united breadths of the plates are not to be less than three times the diameter of the masts; these plates are to be well riveted to each other, and to the beams, and angle iron carlings; and at the decks, where the masts are to be wedged, an angle iron of the dimensions required for the main frame of the ship is to be properly fitted and riveted to the plate round the mast holes. The mast holes, skylights, and companions must be properly secured to the satisfaction of the Surveyors. Where wood comings are fitted, plates are to be riveted to the beams to which the deck ends are to be fastened.

SKYLIGHTS.

The skylights to engine-rooms, and the comings to which they are attached, are in all cases to be substantially constructed, and efficiently fastened to the beams, and, whether of iron or wood, are not to be less than two feet six inches above the upper deck in one or two-decked vessels, and one foot six inches above spar or awning decks. The skylights to be securely attached to the comings, and the glass in them should be very strong, from three-eighths to half an inch thick, protected by a strong guard of iron rods, or by a framework of wire; in addition, deadlights of either iron or wood should be fitted having bull's eyes in them, and arrangements made for their efficient security in bad weather. Strong tarpauling covers are in all cases to be provided. In spar-decked vessels, and those having either a poop, awning deck or bridge house, with the engine room beneath, the hatchways in the upper deck are to be enclosed by iron trunk bulkheads, not less than five-sixteenths of an inch thick, strengthened by angle iron and extended from the upper deck to the beams above, to which they are to be secured. Strong iron doors will be allowed in these trunk bulkheads, provided their lower parts are at least eighteen inches above the upper deck, and arrangements made for their efficient security.

COAL BUNKERS.

Coal bunker pipes, where practicable, are to be formed so as to be at least six inches above the upper deck, fitted with gratings and lids, the latter to have studs to fit in openings made in the pipes for their

security, the pipes to be so formed that tarpauling may be securely lashed over them. Where it is necessary to fit flat coal bunker scuttle lids flush with the deck, they must be secured by a bar, or other approved fastening.

BUTT-STRAPS.

Section 30. Butt-straps in all cases, except those of floor plates (*see* Section 13), to be one-sixteenth of an inch thicker than the plates they connect, and to be fitted with the fibre of the iron in the same direction as that of the plates, and riveted as per Section 4.

BUTT-PLATES OF OUTSIDE PLANKING.

Section 31. The plates to which the butts of the outside planking are to be secured must be of the breadth of the planks, extending from frame to frame, efficiently riveted thereto, and of the thickness given in Table H; but on the bows and quarters, or wherever else the plank ends may have a tendency to strain off, they are to be one-eighth of an inch thicker than therein prescribed.

PLANKING.

Section 32. The material for planking to be in accordance with class in Table I, to be thoroughly seasoned, quite free from sap, wane, or other defects, to be wrought with the heart side to the frames, and with not less than three strakes between the butts, without step butting, and with not less than six-feet shifts; the garboard strakes to be shifted, and of the thickness given in Section 7; the bottom planking is not to be less in thickness than prescribed in Table H, from the garboard strakes up to within a fifth of the depth of hold set down below the upper deck stringer plate; from thence to the plank sheer to be in thickness as prescribed in Table H for topsides; or, if preferred, the bottom planking may retain its thickness up to within a fourth of the depth of hold set down below the upper deck stringer plate, and from thence to the plank sheer be gradually diminished in thickness to that prescribed in Table H for topsides; the thickness of the wood sheerstrakes may be the thickness of the iron sheerstrake they cover less than that prescribed by Table H.

Outside planks (except the garboard strakes) are not to be more than twelve inches broad; they are to be fitted quite close to the frames and plates, and to each other at their inner edges, and wrought with proper seams outside in proportion to their thickness; the hood ends may be reduced one-fifth from the thickness given in Table H at the stem or sternpost, and one-third at the buttock. The caulking edge of the keel seam, and hood end seams of the planking at the stem and sternpost, need not exceed from two and a half inches to four inches, in proportion to the tonnage of the vessel; which can be arranged by trimming the back rabbet from the bearding line to the rabbet line, as required, so as not to unnecessarily reduce the keel, stem, and sternpost. Furrens or pads are in no case to be used.

BOLTS.

Section 33. The bolts to be not less than the sizes given in Table K; the garboard strakes to be cross-bolted from side to side, with bolts not exceeding four feet six inches apart.

The wood keel to have a vertical bolt through the keel plate between each frame. The stem, sternpost, deadwood, and remainder of the keel, to be through fastened in all cases, and the bolts spaced as in the keel.

The screw-pointed bolts for fastening the planking, when less than five inches thick, to be of such form under the heads as will prevent them from turning; their heads to be once and three-quarters the diameter of the bolts,

and two-fifths their diameter in thickness; the nuts in all cases to be of the same description of metal as the bolts they are applied to, and to be in thickness equal to their diameter, and not to have less substance than three-eighths of the diameter of the bolts in any part, whatever the form may be, hexagon form being preferred.

All outside planks ten inches broad and above, to be double fastened; eight inches and a half and under ten inches, double and single fastened alternately; and under eight and a half inches, single fastened; and all butts to be double fastened.

The bolt holes in the outside planking to be enlarged with a dowelling machine for the bolt heads, which in the bottom up to within one-fifth the depth of hold set down below the upper deck stringer plate, are to be sunk within the surface of the planking one inch and a quarter, when dowels are intended to be used; from thence to the planksheer they need not be sunk more than three-quarters of an inch; the bolts to be properly driven with oakum and white lead, putty, marine glue, or other suitable composition under their heads, and in the bottom they are to be carefully covered (after the seams in the bottom are all caulked) with turned well-seasoned wood dowels, the fibre of which must be in the same direction as the planking, and be driven with white lead, marine glue, or any other approved composition. Where copper or yellow metal bolts are used, the sinking of them within the surface of the planking to be optional to the above extent.

PLANKING OF TWO THICKNESSES.

Section 34. If the vessel is to be planked with two thicknesses, the whole of the inside thickness must be of material required by Table I for the upper part of the vessel, and the outside thickness, if worked longitudinally, must be of the same material as is prescribed for a vessel constructed with a single thickness of planking, but, if the outside thickness is to be worked diagonally, American Rock Elm may be used. If either or both thicknesses be worked longitudinally, or diagonally, each thickness need only be one-half that prescribed in Table H, but thick garboard strakes will be required to be fitted and fastened as in the case of vessels with a single thickness of planking. When the outside thickness is worked diagonally, a longitudinal strake of plank must be rabbeted into the garboard strake, and the ends of the diagonal planks butted against it; there must also be one or more longitudinal strakes of plank of the materials prescribed in Table I for the upper part of the vessel, fitted above the upper ends of the diagonal planking; and, if the topsides be of a single thickness, the upper edge of the said longitudinal planking must be partly let into the topside plank or be rabbeted into a solid strake, so that it may be efficiently caulked. In all such cases both thicknesses must be caulked, and the outer thickness wrought hot on the *best hair felt.*

If both thicknesses of plank be worked diagonally, transversely to each other, from keel to gunwale, the bilge and diagonal plates may be dispensed with; but, where the thicknesses are otherwise arranged, the bilge and diagonal plates must be fitted as in vessels with single thickness; the diagonal plates may, however, be extended to ten feet apart on a square with three pairs crossing each other in the centre.

When the inner thickness of plank is wrought diagonally, all the planks must be double fastened to the frames, but, when wrought longitudinally, they may be fastened as per Section 33, the bolts in either case must be of the size prescribed in Table K. The outer thickness of plank must be secured to the inner by nut and screw bolts, or else by wrought copper bolts, driven through the inner thickness and clenched inside upon copper or yellow metal rings; a reduction of one-fifth of the diameter from that prescribed in Table K will be allowed when nut and screw bolts are used for fastening the outer thickness of plank, and a reduction of one-third when it is intended to use wrought copper and to clench the bolts of this thickness.

In vessels claiming the additional period for copper or yellow metal bolts, the fastenings in both thicknesses must be of the description and to the height required in those having only one thickness. Where two thicknesses of planking are adopted, dowelling will not be allowed in either thickness.

When the planking is composed of two thicknesses, the outside thickness of planking should not exceed ten inches in breadth, and may be single fastened, but the fastenings are not to exceed twenty inches apart on an edge; if, however, planks are used in the lower part of the bottom more than ten inches but not exceeding twelve inches in breadth, their fastenings are not to exceed eighteen inches apart on an edge.

All iron work, and all iron and wood surfaces which come in contact with each other, are to be properly coated with good paint, or other suitable composition.

CAULKING.

Section 35. It is indispensable that the caulking should be well executed, and no material used but the best brown oakum, with tarred spun yarn for the inner thread of bottom. The Surveyors are required to see the caulking thoroughly tested with a beetle and horse, especially in new vessels, and at all surveys when the sheathing is stripped off the bottom.

In vessels with two thicknesses of planking, the condition of the caulking of the outside thickness is to be ascertained, in new vessels, by having a few pieces cut out from the bottom planking so as to expose the oakum; but it will not be necessary to have pieces cut out in vessels with single bottoms, as it can be ascertained whether the oakum is properly driven into the seams by inserting a thin knife into them from within the vessel.

KNIGHTHEADS, HAWSE TIMBERS, UPPER-DECK WATERWAYS, AND PLANKSHEER.

Section 36. Where the knightheads, hawse timbers, upper-deck waterways, and plankshеer are of wood, they must be of materials according to class in Table I, and fastened with bolts as in Table K.

The knightheads and hawse timbers are to be of sufficient siding and moulding, and to have boxing either outside or inside above the upper deck; they are to extend high enough for the efficient security of the bowsprit, and sufficiently below the upper deck to insure strength; to be well bolted, and connected by substantial hooks.

WATERWAYS.

Where the roughtree stanchions are of wood, the depth and moulding of the upper deck waterway must be sufficient to give them support; but the depth of the waterway is in no case to be less than three times the thickness of the upper deck, excepting where the plankshеer covers it, and it will be required to be well bolted through the sheerstrakes or spirketting plate and upper deck stringer plate.

DECKS.

Section 37. The flat of all decks to be of good quality, properly seasoned, free from sap and objectionable knots, the thickness and fastenings as per Table H.

DECK BOLTS.

The upper deck plank to be fastened by screw bolts from the upper side with nuts at the under side of the angle iron of the beams, and to the tie-plates (*see* Section 29). The bolts must be properly sunk with

oakum and white lead under their heads, and be carefully covered over with turned dowels, with the fibre in the same direction as the deck plank, bedded in white lead, marine glue, or other suitable composition.

When the deck planks are six inches in width and under, single fastening will be sufficient; but, when they are above six inches and not exceeding eight inches in width, there must be two bolts in each plank in every beam, one of which may be a short screw bolt; and planks exceeding eight inches in width must be double fastened with nut and screw bolts.

If the deck is of teak, it may be one-eighth less in thickness than prescribed in Table H.

Upper decks must be renewed when worn in thickness as follows, viz.:—When a deck originally 4 inches thick is worn to 3 inches; $3\frac{1}{2}$ inches to $2\frac{3}{4}$ inches; 3 inches to $2\frac{1}{2}$ inches.

CEILING.

Section 38. All vessels to be closely ceiled from the main keelson to the upper part of the bilges, the ceiling to be secured in such a manner as to be easily removed, and from the upper part of the bilges upwards, either close ceiling or batten and space may be adopted, but the latter is considered preferable. It is recommended that the ceiling on the floors should be made in hatches, where practicable, of convenient sizes, so as to be lifted when required for the purpose of survey, or for cleaning and painting. The thickness of the ceiling in the hold from the main keelson to the upper part of the bilges to be in accordance with Table H, and one-third less in thickness from thence upwards.

RUDDER.

Section 39. The main piece of rudder to be of timber, according to class in Table I, of dimensions as per Table H, and the pintles as per Table K. In screw steamers, the size of the main piece of rudder must be increased in diameter not less than one-eighth above the dimensions given in Table H, and the pintles and braces in the same proportion.

RUDDER BRACES.

The lower rudder brace is to extend on the bottom planking sufficiently to receive not less than three bolts before the hood ends in addition to the bolts in the sternposts; the remaining braces will not be required to pass the hood ends, but the ends of their arms should be made ⊣ shaped, or of other suitable form, so as to receive three through bolts in the sternpost.

CHAIN PLATE AND PREVENTER BOLTS.

Section 40. The chain plate and preventer bolts to be of the sizes given in Table K. When the chain and preventer plates are fitted on wood topsides, and the chain and preventer bolts are arranged to pass through below the iron sheerstrake, a plate is to be riveted to the frames, before working the wood topsides, of the same thickness as the sheerstrake, sufficiently wide to take the said bolts, and fillings of wood may be introduced between the frames for the bolts to pass through and be clenched upon plates, or otherwise secured to the satisfaction of the Surveyors.

CEMENT.

Section 41. All vessels to be efficiently cemented in the bottom, to the upper part of the bilges, care to be taken to have proper watercourses above the cement all fore and aft.

Section 42. The Surveyors in their reports of vessels for original classification, which have partial deficiencies in either the workmanship, materials, or construction, are to state the same for the consideration of the Committee, when such vessels will be liable to have a reduced number of years assigned to them than they would otherwise have been entitled to.

The Surveyors in submitting their reports of vessels not already classed, are in all cases, where practicable, to forward a sketch of the midship section, and other drawings where necessary, to be furnished by the builders, with figured dimensions of the component parts marked thereon.

Builders wishing to adopt plans other than those described herein, are to submit them, in the usual manner through the Resident Surveyors (who are to state their opinions thereon), for the Committee's consideration and approval.

PERIODICAL SURVEYS DURING CLASSIFICATION.

* PERIODICAL SURVEYS. (*See* N.B. at foot.)

Section 43. All vessels to be surveyed annually if practicable; and whenever the copper, yellow metal, wood, or other sheathing, is stripped off, the condition of the planking, fastenings, and caulking to be ascertained.

Vessels marked C.F. to be subject to a special survey every *four* years; and those marked G.I.B. and I.B. to be subject to a special survey every *three* years. Such Special Surveys will be noted in the Register Book.

When these Special Surveys are held, the vessel to be placed on blocks of a proper height in a dry dock, or upon ways; if she is sheathed with wood, a sufficient quantity must be removed for the examination of the bolts, caulking, and planking.

At the first Special Survey the limber boards, and ceiling equal to one strake fore and aft on both sides in the hold, below the upper turn of bilge, must be removed.

At subsequent Special Surveys, ceiling equal to an additional strake on both sides in the hold, and one strake on both sides in the 'tween decks (provided it is close ceiled), must be removed; portions of the cement to be cut out to ascertain its condition, and that of the frames and keel plate; bolts of the bottom and keel, if of iron, to be got out for examination,—the number removed, and their condition, to be stated in the Report of Survey. If the frames, floors, &c., are found to be much oxidized, the whole of the ceiling to be removed and the oxidation cut or beaten off, and the iron work, if necessary, renewed, and the whole then to be properly coated or painted.

At the second Special Survey the windlass to be unhung where necessary, and its wood lining sufficiently stripped for examination, and the chain cables ranged for inspection.

* In the case of Steam Vessels, *see* Section 24, for Survey of Engines and Boilers.

N.B.—In reference to the Rules above quoted, and in order to prevent the disappointment arising from ships losing their Characters from want of survey, it is hereby intimated that the duty of giving NOTICE OF PERIODICAL SURVEYS *required by the Rules, or when repairs are necessary in consequence of damage, or from other causes, rests with the Owners, Masters, or Agents.*

VESSELS NOT SURVEYED WHILE BUILDING.

Section 44. Vessels built in Great Britain, or the British North American Colonies, which have not been surveyed while building, will lose one year of the period to which they might otherwise have been entitled.

When a character is claimed for such a vessel, she must be placed on high blocks in a dry dock, or on a slip, or other convenient place, so that the keel and bottom may be seen and properly examined. The hold must be cleared, and proper stages made, the outside planking scraped bright from the light water-mark to the waterway seam, a sufficient number of fastenings removed from the keel, the planking of the flat of bottom, the bilges, between the light and load-line, and from the topsides, in order that their condition may be thoroughly ascertained.

Should the vessel be less than four years old from the date of launching, if close ceiled, a quantity of ceiling equal to one strake fore and aft on each side in the 'tween decks, a like quantity at the upper turn of bilge, and one plank at the lower turn of the bilge on each side over the floors in midships, will be required to be removed, and the limber boards lifted; but should the vessel exceed four years of age, unless she be found in a very clean and satisfactory condition, the whole of the ceiling, or such portion as the Surveyors may require, must be removed, excepting in the case of "batten and space ceiling."

WOODEN FLOORS, &c.

Should the vessel, however, have been constructed with wooden floors, or with iron and wooden frames and with through fastenings, passing through the ceiling, and she be under four years of age, it will be sufficient if, in lieu of removing the ceiling as above described, a listing be cut out fore and aft on both sides in the 'tween decks 4 inches wide, a ceiling plank at the upper turn of the bilge and at the lower turn of bilge on each side over the floors to be taken out, and the limber boards lifted; but if she exceed four years of age, in addition to the above, a 4-inch listing must be extended fore and aft at the turn of the bilge on each side; and at other parts if considered necessary by the Surveyors.

When the foregoing preparations have been made, a careful survey must be held by two Surveyors (one of them to be an exclusive officer of the Society), who shall submit a report and midship section containing a full description of the vessel, comparing the same with the Rules.

Should a vessel submitted for classification be sheathed with wood or metal, the same will not be required to be stripped off (if all be found satisfactory to the Surveyors) beyond a sufficient quantity at the keel, hood ends, bilges, and between the light and load water-lines, for the purpose of ascertaining the condition of the caulking and the fastenings.

CONTINUATION OF SHIPS ON THE A CHARACTER.*

Section 45.—If, on the expiration of the term of years originally assigned, or at any age of a vessel, the owner be desirous to have his ship remain or be replaced on the letter A, such continuation will

* Where composite vessels are not constructed in accordance with the Committee's printed suggestions, and a deviation is required from a strict compliance with the Rules, special application must be made to the Committee.

be granted for a period not exceeding two-thirds the number of years assigned originally, provided that a Special Survey as hereafter described be held by two Surveyors, one of them to be an exclusive officer of the Society, and that all repairs found necessary be completed to their satisfaction. The number of years assigned on continuation to commence from the date of the completion of such repairs.

The ship must be placed in dry dock or laid on blocks upon ways, so that the keel and bottom may be examined.

All sheathing (wood and metal) to be entirely stripped off the bottom and elsewhere.

The hold to be cleared, and proper stages made both inside and outside.

All the outside planking from the light water-mark upwards, including planksheers and waterways, to be scraped or dubbed bright.

All the close ceiling, where the frames and floors are of iron, to be removed from the upper part of the bilges downwards, and, where close ceiling is fitted above this height, two strakes of ceiling are in addition to be removed between decks, and two strakes in the hold all fore and aft, when, should the condition of the frames and planking render it, in the opinion of the Surveyors, necessary, the whole of the close ceiling is to be removed.

The planking of one strake extending from amidships forward on one side, and from amidships aft on the other side, to be removed to expose the bilge plate, diagonal plates, and the backs of the frames, and when the iron sheerstrake is covered with planking an additional plank is to be removed in way of the same.

Not less than twelve bolts on each side, whether of iron or yellow metal, to be driven out in ships of 500 tons and under, and increased in number in proportion to the size of the ship; also cement to be removed in places, for the purpose of ascertaining the condition of the floors, frames, iron keel-plate, butt-straps to outside planking, &c.

Where the middle line bolts are of iron, their condition is to be ascertained; but, if this be not practicable, additional intermediate bolts of copper or yellow metal must be driven through and clenched.

The windlass to be unhung, and its wood lining sufficiently stripped for examination.

The cables to be ranged, and the anchors and general equipment examined. The coal bunkers in steamers to be cleared, and all iron-work to be scraped clean.

The annual and special periodical surveys to apply to vessels so continued as required by Section 43 *for ships on original class.*

By Order of the Committee,

BERNARD WAYMOUTH,
Secretary.

No. 2, *White Lion Court, Cornhill, London, E.C.*
1*st July*, 1883.

TABLE H.

COMPOSITE SHIPS.—TABLE OF MINIMUM DIMENSIONS OF FRAMES, PLANKING, KEELS, KEELSONS, STEMS, STERN POSTS, FLOOR PLATES, BEAMS, STRINGERS, &c.

All plates, and all beam and angle iron, used in ships intended for classification, are to be stamped legibly in two places with the manufacturer's trade mark, or his name and the place where made.

Tonnage. *See Notes to Table.*	Distance of Frames from Moulding Edge to Moulding Edge all Fore and Aft.	Siding of Keel, Stem, and Stern Post, and Moulding of Stem.	Moulding of Stern Post and Keel.	Breadth and Thickness of Keel Plate, Flat Plate Keelson, and Thickness of Single Plate Vertical Keelson, standing upon Floors.		Dimensions of Angle Iron for Frames, and the Lower Angle Irons of Box Keelsons.	Dimensions of Angle Iron for Reversed Frames, and the Top Angle Irons of Box Keelsons.	Thickness of Centre Plate Keelson, Sheerstrake, (where not planked over) also of Butt Plates for Planking in Midships.	Thickness of Floor Plates, Hooks, Crutches, Side Intercostal, and Box Keelson.	Thickness of Stringer Plates upon Beam Ends, Tie Plates on Beams, Sheer strake (where planked over) and Topside Plating (where not planked over) Bilge Strake and Diagonal Plates on Frames, and Middle Line Intercostal Keelsons.	Dimensions of Angle Iron on Beam Stringers, Stringers in Hold, and Keelsons.	Diameter of Solid Pillars to Beams.		Thickness of Outside Plank.		Thickness of Upper Deck, and Plank-sheer. *See Notes to Table.*	Thickness of Wood Ceiling in Hold to upper part of Bilges.	Windlass. *See Notes to Table.*		Main Piece of Rudder, from Lower Part of Counter upwards, Pall Bitt, and Wood Keelson, Sided and Moulded.	Tonnage. *See Notes to Table.*
				Breadth.	Thickness.							Hold.	Deck.	From the Garboard Strake up to within one-fifth of the Depth of Hold set down below the Upper Deck Stringer.	Topsides from the Plank-sheer to within one-fifth of the Depth of Hold set down below the Upper Deck Stringer.			Diameter of Iron Spindle.	Diameter of Main Piece.		
Tons.	inches.	inches.	inches.	inches.	inches.	inches.	inches.	inches.	inches.	inches.	inches.	inches.	inches.	inches.	inches.	inches.	inches.	inches.	inches.	inches.	Tons.
50 and under 100	18	$9\frac{1}{2}$	11	19	$\frac{8}{16}$	$2\frac{3}{4}\times2\frac{3}{4}\times\frac{5}{16}$	$2\frac{1}{4}\times2\frac{1}{4}\times\frac{4}{16}$	$\frac{6}{16}$	$\frac{5}{16}$	$\frac{5}{16}$	$3\times3\times\frac{5}{16}$	—	2	4	$2\frac{1}{2}$	$2\frac{3}{4}$	$1\frac{1}{2}$	$2\frac{1}{4}$	$12\frac{1}{2}$	$9\frac{1}{2}$	50 and under 100
100 and under 200	18	$10\frac{1}{2}$	12	21	$\frac{9}{16}$	$2\frac{3}{4}\times2\frac{3}{4}\times\frac{6}{16}$	$2\frac{1}{4}\times2\frac{1}{4}\times\frac{5}{16}$	$\frac{7}{16}$	$\frac{5}{16}$	$\frac{6}{16}$	$3\times3\times\frac{6}{16}$	$2\frac{1}{2}$	$2\frac{1}{4}$	4	3	3	$1\frac{1}{2}$	$2\frac{1}{2}$	14	11	100 and under 200
200 and under 300	18	$11\frac{1}{2}$	13	23	$\frac{10}{16}$	$3\times3\times\frac{6}{16}$	$2\frac{1}{4}\times2\frac{1}{4}\times\frac{5}{16}$	$\frac{8}{16}$	$\frac{6}{16}$	$\frac{7}{16}$	$3\times3\times\frac{6}{16}$	$2\frac{3}{4}$	$2\frac{3}{8}$	$4\frac{1}{2}$	$3\frac{1}{2}$	$3\frac{1}{4}$	$1\frac{3}{4}$	$2\frac{3}{4}$	15	12	200 and under 300
300 and under 400	18	$12\frac{1}{2}$	14	25	$\frac{10}{16}$	$3\times3\times\frac{6}{16}$	$2\frac{1}{2}\times2\frac{1}{2}\times\frac{5}{16}$	$\frac{9}{16}$	$\frac{7}{16}$	$\frac{8}{16}$	$3\times3\frac{1}{2}\times\frac{6}{16}$	$2\frac{7}{8}$	$2\frac{3}{8}$	$4\frac{1}{2}$	$3\frac{1}{2}$	$3\frac{1}{2}$	2	3	16	13	300 and under 400
400 and under 500	18	13	$14\frac{1}{2}$	26	$\frac{11}{16}$	$3\frac{1}{4}\times3\frac{1}{2}\times\frac{7}{16}$	$2\frac{1}{2}\times2\frac{3}{4}\times\frac{6}{16}$	$\frac{9}{16}$	$\frac{7}{16}$	$\frac{8}{16}$	$3\times4\times\frac{6}{16}$	3	$2\frac{1}{2}$	5	4	$3\frac{1}{2}$	$2\frac{1}{4}$	$3\frac{1}{4}$	17	14	400 and under 500
500 and under 600	18	$13\frac{1}{2}$	15	27	$\frac{11}{16}$	$3\frac{1}{4}\times3\frac{1}{2}\times\frac{7}{16}$	$2\frac{1}{2}\times3\times\frac{6}{16}$	$\frac{10}{16}$	$\frac{8}{16}$	$\frac{9}{16}$	$3\frac{1}{2}\times4\times\frac{7}{16}$	$3\frac{1}{8}$	$2\frac{1}{2}$	5	4	$3\frac{3}{4}$	$2\frac{1}{2}$	$3\frac{1}{2}$	18	$14\frac{3}{4}$	500 and under 600
600 and under 700	18	14	$15\frac{1}{2}$	28	$\frac{12}{16}$	$3\frac{1}{2}\times4\times\frac{8}{16}$	$2\frac{3}{4}\times3\times\frac{6}{16}$	$\frac{10}{16}$	$\frac{8}{16}$	$\frac{9}{16}$	$3\frac{1}{2}\times4\frac{1}{2}\times\frac{7}{16}$	$3\frac{1}{4}$	$2\frac{1}{2}$	$5\frac{1}{2}$	$4\frac{1}{2}$	$3\frac{3}{4}$	$2\frac{1}{2}$	$3\frac{5}{8}$	19	$15\frac{1}{2}$	600 and under 700
700 and under 800	18	$14\frac{1}{2}$	16	29	$\frac{12}{16}$	$3\frac{1}{2}\times4\times\frac{8}{16}$	$3\times3\times\frac{6}{16}$	$\frac{11}{16}$	$\frac{9}{16}$	$\frac{10}{16}$	$4\times4\frac{1}{2}\times\frac{8}{16}$	$3\frac{3}{8}$	$2\frac{1}{2}$	$5\frac{1}{2}$	$4\frac{1}{2}$	4	$2\frac{3}{4}$	$3\frac{3}{4}$	20	16	700 and under 800
800 and under 900	18	15	$16\frac{1}{2}$	30	$\frac{13}{16}$	$3\frac{3}{4}\times4\frac{1}{2}\times\frac{9}{16}$	$3\times3\times\frac{7}{16}$	$\frac{11}{16}$	$\frac{9}{16}$	$\frac{10}{16}$	$4\times5\times\frac{8}{16}$	$3\frac{1}{2}$	$2\frac{1}{2}$	6	$4\frac{3}{4}$	4	$2\frac{3}{4}$	4	21	$16\frac{1}{4}$	800 and under 900
900 and under 1000	18	$15\frac{1}{2}$	17	31	$\frac{13}{16}$	$3\frac{3}{4}\times4\frac{1}{2}\times\frac{9}{16}$	$3\times3\frac{1}{4}\times\frac{7}{16}$	$\frac{12}{16}$	$\frac{10}{16}$	$\frac{11}{16}$	$4\times5\times\frac{9}{16}$	$3\frac{1}{2}$	$2\frac{5}{8}$	6	$4\frac{3}{4}$	4	$2\frac{3}{4}$	$4\frac{1}{4}$	22	$16\frac{1}{2}$	900 and under 1000
1000 and under 1200	18	16	$17\frac{1}{2}$	32	$\frac{14}{16}$	$3\frac{3}{4}\times4\frac{3}{4}\times\frac{9}{16}$	$3\times3\frac{1}{2}\times\frac{8}{16}$	$\frac{12}{16}$	$\frac{10}{16}$	$\frac{11}{16}$	$4\frac{1}{2}\times5\times\frac{9}{16}$	$3\frac{1}{2}$	$2\frac{5}{8}$	$6\frac{1}{4}$	5	4	3	$4\frac{1}{2}$	23	$16\frac{3}{4}$	1000 and under 1200
1200 and under 1500	18	$16\frac{1}{2}$	18	33	$\frac{14}{16}$	$3\frac{3}{4}\times4\frac{3}{4}\times\frac{9}{16}$	$3\frac{1}{2}\times3\frac{1}{2}\times\frac{8}{16}$	$\frac{13}{16}$	$\frac{11}{16}$	$\frac{12}{16}$	$4\frac{1}{2}\times5\frac{1}{2}\times\frac{9}{16}$	$3\frac{5}{8}$	$2\frac{5}{8}$	$6\frac{1}{4}$	5	4	3	$4\frac{5}{8}$	24	17	1200 and under 1500
1500 and under 2000	18	17	$18\frac{1}{2}$	34	$\frac{15}{16}$	$4\times5\times\frac{10}{16}$	$3\frac{1}{2}\times4\times\frac{9}{16}$	$\frac{13}{16}$	$\frac{11}{16}$	$\frac{12}{16}$	$5\times6\times\frac{9}{16}$	$3\frac{3}{4}$	$2\frac{3}{4}$	$6\frac{1}{2}$	$5\frac{1}{4}$	4	3	$4\frac{5}{8}$	$25\frac{1}{2}$	$17\frac{1}{2}$	1500 and under 2000
2000 and under 2500	18	$17\frac{1}{4}$	19	$34\frac{1}{2}$	$\frac{15}{16}$	$4\times5\frac{1}{2}\times\frac{10}{16}$	$3\frac{1}{2}\times4\frac{1}{2}\times\frac{10}{16}$	$\frac{14}{16}$	$\frac{12}{16}$	$\frac{13}{16}$	$5\frac{1}{2}\times6\frac{1}{2}\times\frac{10}{16}$	$3\frac{3}{4}$	$2\frac{3}{4}$	7	$5\frac{3}{4}$	4	3	$4\frac{3}{4}$	27	18	2000 and under 2500
2500 and under 3000	18	$17\frac{1}{4}$	$19\frac{1}{4}$	$34\frac{1}{2}$	$\frac{15}{16}$	$4\times6\times\frac{11}{16}$	$3\frac{1}{2}\times4\frac{1}{2}\times\frac{10}{16}$	$\frac{14}{16}$	$\frac{12}{16}$	$\frac{13}{16}$	$5\frac{1}{2}\times6\frac{1}{2}\times\frac{10}{16}$	$3\frac{3}{4}$	$2\frac{3}{4}$	$7\frac{1}{2}$	6	4	3	$4\frac{3}{4}$	$28\frac{1}{2}$	19	2500 and under 3000
3000 and under 3500	18	$17\frac{1}{2}$	$19\frac{1}{2}$	35	$\frac{16}{16}$	$4\times6\frac{1}{2}\times\frac{11}{16}$	$3\frac{1}{2}\times4\frac{1}{2}\times\frac{10}{16}$	$\frac{15}{16}$	$\frac{12}{16}$	$\frac{13}{16}$	$5\frac{1}{2}\times6\frac{1}{2}\times\frac{10}{16}$	$3\frac{3}{4}$	$2\frac{3}{4}$	8	6	4	3	5	30	20	3000 and under 3500

MEM.—The scantlings given in the above Table are intended for Ships the length of which, measured from the fore part of the Stem to the after part of the Stern-post on the range of the Upper Deck, does not exceed seven times their moulded breadth or ten times their depth of Hold, taken from the upper part of Floors to the top of the Upper Deck Beams. *For Ships which exceed these proportions, the plans to be submitted for the Committee's consideration.* The depth for defining the proportions of spar decked vessels, is to be measured from the top of the floor plates to the upper side of the middle or tonnage deck beams.

RIVETS. Diameter of Rivets required for Thickness of Plates - - -	$\frac{5}{8}$ of an Inch.		$\frac{3}{4}$ of an Inch.			$\frac{7}{8}$ of an Inch.				1 Inch.		
	$\frac{5}{16}$	$\frac{6}{16}$	$\frac{7}{16}$	$\frac{8}{16}$	$\frac{9}{16}$	$\frac{10}{16}$	$\frac{11}{16}$	$\frac{12}{16}$	$\frac{13}{16}$	$\frac{14}{16}$	$\frac{15}{16}$	$\frac{16}{16}$

Diameter of Nut and Screw Bolts for Fastening Flat of Deck.

3 ins. and under $3\frac{1}{2}$ ins. - - $\frac{1}{2}$ inch
$3\frac{1}{2}$,, ,, 4 ,, - - $\frac{9}{16}$,,
4 inches - - - - - - $\frac{5}{8}$,,

Lloyd's Register of Shipping, London, 15th May, 1879.

NOTES TO TABLE H.

TONNAGE.—In flush-decked vessels having either one, two, or three decks (not being spar or awning-decked), the tonnage under the upper deck, *without abatement of the tonnage of the space for the crew, or for the propelling power of steam vessels*, is to regulate all the scantlings of the hull, and also the equipment of the vessel. In vessels having a *raised quarter deck*, or a poop, or top-gallant forecastle, or deck houses, or awning deck, or spar deck, the total tonnage below the tonnage deck is to regulate the scantlings of the hull, but the register tonnage, as cut on the main beam of sailing vessels and of steam vessels, *with the addition of the tonnage of the space required for propelling power*, is to regulate the equipment, and also the size of the main piece of rudder and windlass, and the keel and keelsons and their number, and the scantling of the stringer plates on the upper and lower deck beams, and the requirements as to double rivetting. But in vessels where the tonnage of the erections above the tonnage deck is less than that required for crew space, *then the difference* between the tonnage of these erections and the tonnage of the space allowed for crew is to be *added* to the register tonnage, cut on the main beam, for the tonnage that is to regulate the equipment and the size of the main piece of rudder and windlass, and the keel and keelsons and their number, the scantling of the stringer plates on the upper and lower deck beams, and the requirements for double rivetting.

WOOD KEEL, Stem, and Stern Post to be of the dimensions specified in Table.

KEEL PLATE.—The keel plate to be of the breadth and thickness prescribed in Table H, to be made continuous up the apron and up the inner stern-post as high as practicable, but in all cases to extend above the lower deck or hold beam stringer angle iron. Forward and aft the plate is to be curved to the form of the bearding line, and to be one-sixteenth of an inch thicker than prescribed in the Table, where it passes over the deadwoods, apron, and inner stern-post, and to be sided as required by the form of the vessel, to have an angle iron of the size given in Table for stringer angle irons rivetted on each edge, flanged to the form of the vessel to receive the plank fastenings. The keel plate to maintain its breadth for three-fifths the length of the keel in midships, and then to be gradually reduced until its edges conform with the flange of the angle iron on the keel plate forward and aft; the butts of the keel plates to be shifted clear of the keel scarphs.

FRAMES.—The frames to be of the dimensions as set forth in Table, and the narrow flange to be of a parallel thickness, that the nuts of the screw bolts may fit closely. The frames to be in as long lengths as possible, fitted and rivetted on to the keel plate, and extended as near to the middle line as practicable, according to the plan of construction adopted, and in all cases to extend to the gunwale, and where raised quarter decks, poops, forecastles and spar decks are constructed, to their deck stringers respectively, except when constructed with a rounded form at the gunwale, then they may terminate at the lower part of the curve; if the frames be welded, the welds to be perfect with not less than four feet shifts from the welds of next frames, or if butted to have not less than four feet shifts with four feet lengths of angle iron of the same size as the frame, fitted back to back rivetted to them, and secured to the outside planking. The spacing of the frames (where one thickness of planking in the bottom is intended) not to exceed 18 inches from moulding edge to moulding edge all fore and aft, a four feet length of angle iron, the size of the frame, is to be rivetted to each floor and to the keel plate, back to back with the frames.

FLOOR PLATES.—The floor plates to be in thickness according to Table, but at each end of the vessel for one quarter of her length they may be reduced in thickness one-sixteenth of an inch where the midship floor plates are six-sixteenths and under ten-sixteenths of an inch, and two-sixteenths of an inch where the plates are ten-sixteenths and above in thickness. The floor plates to be in depth at middle line according to the following rule, viz., to the vessel's depth, measured from the top of the keel to the top of the upper or spar-decked beams amidships add the extreme breadth of the vessel, two-fifths of that sum in inches to be the depth of the floor plates at the middle line well fore and aft, but at the extreme fore and after ends, they must be deeper, so as to form an efficient connection between the two sides of the vessel. The floor plates are to extend up the bilges not less than to a perpendicular height of *twice* and a *half* the depth of floors amidships, from upper side of keel at middle line; and in no case to be less moulded in any part, than a fair taper between the depth at middle line, and the moulding at their extreme ends, which is to be not less than the moulding of the frames. The ends of the floors to maintain the height prescribed amidships, for one quarter of the vessel's length, they may then be gradually lowered forward and aft until the upper edges of the floor plates are level, which place is to be determined by the form of the vessel, and from that point to the vessel's ends they are to be gradually increased in depth, so as to efficiently connect the sides of the vessel; the upper parts of the floors forward and aft are to be high enough to give ample room between the reverse frames on each side of the vessel, for fitting the keelson angle irons. In vessels having considerable rise of floor, the depth of the floor plates, on a square, at the quarter of the vessel's extreme moulded breadth, set out from the middle line, is to be not less than three-fifths the depth of the floor plate, at the middle line, and the floor plate is to be extended up the bilges, by a fair taper from middle line, until it terminates at the moulding of the frames. A floor plate to be fitted and rivetted to every frame, and to be extended across the middle line; but where a vertical centre plate is adopted at middle line, then the floor plates are to be efficiently connected to it on each side by double vertical angle irons of not less size than the reversed frames. When floors extend from side to side and are made in two lengths, the butts are to have double butt straps, one on each side of the floor plates, and three-fourths the thickness of the floor plates, or else the floor plates must be lapped and treble rivetted.

WATERCOURSES.—*Watercourses are to be formed through all the floor plates, on each side of the middle line and at the bilges above the frames, so as to allow water to reach the pumps freely, and also through the vertical centre plate, and intercostal keelsons when such keelsons are adopted.*

REVERSED FRAMES.—Reversed angle irons on frames to be in size as per Table. All vessels under 200 tons to have reversed angle-iron rivetted to every frame and floor plate, across the middle line, extended to the height of the upper part of the bilge, and to the gunwale on alternate frames, and to have double reversed angle irons in way of all keelsons and stringers in hold; and in addition, all vessels of 200 tons and upwards, to have reversed angle-iron extended to the upper deck beam stringer on alternate frames, and where raised quarter decks and spar-decks are constructed, to their deck stringers respectively, except when constructed of a rounded form at the gunwale, then they may terminate at the lower part of the curve; and on the remaining frames reversed angle-irons are to be fitted to above the height of the lower deck or hold beam stringer angle-iron, if the vessel has two decks or tiers of beams, and to above the height of the middle deck beam stringer angle-iron, if the vessel has three decks or tiers of beams, the rivets for securing the reversed angle-iron to the frames and floor plates to be in diameter as specified in Table, and be spaced not to exceed a distance of nine times their own diameter from centre to centre; butts of reversed angle-iron to be secured with butt straps.

BEAMS.—Beams to be of bulb plate, with double angle-irons on the top edge, or of T bulb iron, or of any other approved form of equal strength. The upper deck beams to be one quarter of an inch in depth to every foot in length of the midship beam, and to be in thickness one-sixteenth of an inch for every inch in depth, with one-sixteenth of an inch added; if of T bulb the united breadth of the top flanges to be not less than three-fourths the depth of the beam, and where beams are formed of bulb plate with double angle-irons on the top edge, the flanges of each of the angle-irons are not to be less in their united breadth than three-fourths the depth of the beam, and to be one-sixteenth of an inch in thickness for every inch of the two sides of the angle-iron. Middle deck, hold, and orlop beams, to be one-eighth of the depth deeper, and one-sixteenth of an inch thicker than the upper deck beams. All beams to be efficiently connected with the frames by bracket ends, or knee plates, the arms of each to be not less than twice-and-a-half the depth of the beams in length, and of not less thickness than the beams. All beams for at least three-quarters the length of the vessel in midships, and in addition the beams under the bowsprit, pall bit, windlass and capstan are to be pillared; the pillars to have not less than two rivets in each of their ends, so as to form a continuous tie from the keelson to the upper deck, or spar-deck, and to be of the sizes given in Table.

IRON SHEERSTRAKE.—The iron sheerstrake *to be one inch in breadth for every six feet of the vessel's length*, for half her length in midships, and to be of the thickness given in Table; it may then be gradually reduced in breadth and in thickness to three-fourths of the midship breadth and thickness at her ends. The butts of the iron sheerstrake in all cases to be shifted clear of the butts of the stringer plates on the beam ends, the shift in no case to be less than equal to three spaces of frames, and all plates where practicable to be not less than nine feet long, but if the sheerstrake plates are eighteen feet long they may be of two equal breadths, but carvel plated and single rivetted; butts of all plating to be fitted quite close, and in no case is the lower edge of the iron sheerstrake to be fitted less than two-thirds of the breadth required by the Rule for sheerstrake below the upper deck stringer plate. The butt straps in all cases to be in one piece, whether fitted outside or inside, and in no case to be in two pieces by being cut at the stringer plate. *See Section* 30.

IRON BILGE STRAKE.—The bilge strake plates to be two-thirds the breadth of the iron sheerstrake, for three-fifths the length of the keel in midships, and from thence to the ends of the vessel they are to be reduced gradually to one-half their midship breadth; the thickness of the plates to be as prescribed in Table H, and they are to be fitted at the bilges with the middle of the plate at the height prescribed for floorheads, such position for the bilge plates to be maintained, notwithstanding that the floorheads may be carried higher. They are to be extended to the ends of the vessel in accordance with her form, and properly rivetted to the frame.

DIAGONAL PLATES ON FRAMES.—The diagonal plates on the frames to be not less than one-third the breadth of the iron sheerstrake, and fitted in pairs, transversely, all fore and aft, at an angle of 45°, with the butts of each pair meeting between the frames; to be of the thickness given in Table, and connected to the sheer and bilge strake plates by butt straps double rivetted, and to be efficiently rivetted to each other, and to each frame they cross.

STRINGER PLATES.—All vessels to have stringer plates of the thickness given in Table upon the ends of each tier of beams. Those upon the ends of the upper deck beams of one, two, and three decked vessels *to be in width one inch for every seven feet of the vessel's entire length for half her length in midships, and from thence to the ends of the vessel they may be gradually reduced to three-fourths the width in midships*; in no case however is the width in midships to be less than eighteen inches. The stringer plates are to be rivetted to the beams and properly shifted, fitted home, and rivetted to the iron sheerstrake, with an angle iron of the dimensions given in Table, and the roughtree stanchions are not to pass through them. Stringer plates on the ends of beams below the upper deck may be reduced in width to three-fourths the midship breadth of the upper deck stringer, which breadth is to extend all fore and aft, and to have an angle iron of the dimensions given in Table, extending all fore and aft, rivetted to reverse angle iron on each frame and to the stringer plates. In cases where a deck is not laid, and the width of the stringer plate on ends of hold beams is objected to, it may be reduced in width, provided such reduction be fully compensated for. All stringer angle irons are to be in as long lengths as possible, properly shifted, and wherever butted to be connected with angle iron or plate iron not less than two feet long, fitted in the throat of them, properly rivetted to each flange, and the thickness of the connecting plates not to be less than the angle iron they cover. Upper deck gutter waterways are to be flooded to ascertain if there be any leakage, and when completed they are to be properly cemented.

TIE PLATES.—All vessels are to have tie plates ranging all fore and aft upon each side of the hatchways on each tier of beams, and in addition thereto the beams of the upper and middle decks in three decked or spar decked vessels, and of the upper deck in vessels of one or two decks must have tie plates fitted from side to side diagonally, in number one pair for about every 35 feet of the vessel's length; these plates in both cases must not be less in width than once and a half the depth of the beams of their respective decks, and of the thickness required for stringer plates; they are to be well rivetted to each other and to the beams and stringers, and to have intermediate fastenings into the deck plank between the beams, in all cases their butts to be chain rivetted. Upon hold beams where a deck is not to be laid, a tie formed of double angle irons of the size given for the main frames of the ship may be fitted each side of the hatchways in lieu of tie plates, but if the beams are made of such additional strength laterally as not to require the support given by the said angle irons or tie plates, double angle irons of the above size fitted at the centre line, from opening to opening, may be substituted. All hatchways and mast holes are to be properly framed to receive half beams where required, and the latter to have mast partners at each tier of beams (except at orlop beams), the plating of which is not to be less in thickness than is required for stringer plates, and the united breadths of the plates are not to be less than three times the diameter of the masts; these plates to be well rivetted to each other, and to the beams, and angle iron carlings, and at the decks where the masts are to be wedged, an angle iron of the dimensions required for the main frame of the ship is to be properly fitted and rivetted to the plate round the mast hole. The mast holes, skylights, and companions must be properly secured to the satisfaction of the Surveyors. Where wood comings are fitted, plates are to be rivetted to the beams to which the deck ends are to be fastened.

BUTT STRAPS.—Butt straps in all cases, except those of floor plates (*see Section* 13) to be one-sixteenth of an inch thicker than the plates they connect, and to be fitted with the fibre of the iron in the same direction as that of the plates, and rivetted as per Section 4.

BUTT PLATES OF OUTSIDE PLANKING.—The plates to which the butts of the outside planking are to be secured, must be of the breadth of the planks, and extend from frame to frame, efficiently rivetted thereto, and of the thickness given in Table, but on the bows and quarters or wherever else the plank ends may have a tendency to strain off, they are to be one-eighth of an inch thicker than therein prescribed.

RIVETS AND RIVETTING.—The rivets to be of the best quality, and to be of the diameter as per Table, the rivet holes to be regularly and equally spaced, and carefully punched opposite each other in the adjoining parts, from the faying surfaces in the laps, lining pieces, butt straps, and frames, and to be countersunk where required, the rivets not to be nearer to the butts or edges of the plating, lining pieces to butts, or of any angle iron, than a space equal to their own diameter, and not to be further apart from centre to centre than five times their diameter, or nearer than four times their diameter from centre to centre, and to be spaced through the frames and outside plating, and in reversed angle iron a distance equal to nine times their diameter from centre to centre. All butts of iron plating, excepting those of poops and top-gallant forecastles, to be at least double rivetted, and a space equal to twice the diameter of the rivets to be between each row; where treble rivetting is adopted, a space equal to twice the diameter of the rivet to be between each row, with half the number of rivets in the back row.

GARBOARD STRAKES.—The garboard strakes not to be less than two-thirds the depth of the keel prescribed in Table, and properly rabbeted into it, to be fitted closely to the iron keel plate, and to be of sufficient width. The butts of the garboard strakes to have not less than four feet six inches shift from the butts of the garboard strake on the opposite side of the vessel, nor less than the same shift clear of the keel scarph. For bolting, *see Section* 33.

PLANKING.—The planking to be thoroughly seasoned, quite free from sap, wane, or other defects, to be wrought with the heart side to the frames, and with not less than three strakes between the butts, without step butting, and with not less than six feet shifts; the garboard strakes to be shifted and of the thickness given in *Section* 7; the bottom planking is not to be less in thickness than prescribed in Table, from the garboard strakes up to within a fifth of the depth of hold set down below the upper deck stringer plate, from thence to the planksheer to be in thickness as prescribed in Table for topsides; or, if preferred, the bottom planking may retain its thickness up to within a fourth of the depth of the hold set down below the upper deck stringer plate, and from thence to the plank sheer be gradually diminished in thickness to that prescribed in Table for topsides; the thickness of the wood sheerstrakes may be the thickness of the iron sheerstrake they cover less than that prescribed by Table. Outside planks (except the garboard strakes) are not to be more than twelve inches broad; they are to be fitted quite close to the frames and plates, and to each other at their inner edges, and wrought with proper seams outside in proportion to their thickness; the hood-ends may be reduced one-fifth from the thickness given in Table, at the stem or stern-post, and one-third at the buttock. The caulking edge of the keel seam, and hood-end seams of the planking at the stem and stern-post, need not exceed from two and a half inches to four inches, in proportion to the tonnage of the vessel; which can be arranged by trimming the back rabbet from the bearding line as required, so as not to unnecessarily reduce the keel, stem, and stern-post. Furrens or pads are in no case to be used.

DECKS.—The flat of all decks to be of good quality, properly seasoned, free from sap and objectionable knots, the thickness and fastenings as per Table. The upper deck plank to be fastened by screw bolts from the upper side with nuts at the under side of the angle irons of the beams and to the tie plates, *see Section* 29. The bolts must be properly sunk, with oakum and white lead under their heads, and be carefully covered over with turned dowels, their fibre in the same direction as the deck plank, and bedded in white lead, marine glue, or other suitable composition. When the deck planks are six inches in width and under, single fastening will be sufficient; but when they are above six inches and not exceeding eight inches in width, there must be two bolts in each plank in every beam, one of which may be a short screw bolt; and planks exceeding eight inches in width must be double fastened with nut and screw bolts. If the deck is of Teak it may be one-eighth less in thickness than prescribed in the Table. Upper decks must be renewed when worn in thickness as follows, viz.:—
When a deck originally 4 inches thick is worn to 3 inches; $3\frac{1}{2}$ inches to $2\frac{3}{4}$ inches; 3 inches to $2\frac{1}{2}$ inches.

CEMENT.—All vessels to be efficiently cemented in the bottom to the upper part of the bilges, care to be taken to have proper water courses above the cement all fore and aft.

WINDLASS.—The diameter of main piece of windlasses in Steam Ships may be seven-eighths of that required in the Table, provided always the body of the windlass be not of unusual length.

Lloyd's Register of Shipping, London, 24th February, 1870.

TABLE I.

EXHIBITING THE NUMBER OF YEARS TO BE ASSIGNED TO THE DIFFERENT DESCRIPTIONS OF TIMBER USED IN

COMPOSITE SHIPS,

The same to be of good quality, properly seasoned, and free from defects.

	TIMBER.	KEEL.	Stem, Sternpost, Apron, Inner Sternpost, Deadwood, Knightheads and Hawse Timbers.	Floors, Wood Frames and Ceiling upon them; Beams and Keelsons.	OUTSIDE PLANK.		Upper Deck Waterway, Spirketting, Plankshear, and Roughtree Timbers.	RUDDER, WINDLASS, and PALLBITT — Main Pieces.
					From Top of Keel to Two-fifths the Depth of Hold (*a*)	From Two-fifths the Depth of Hold (*a*) to Gunwale.		
1	East India Teak	16	16	16	16	16	16	16
2	Greenheart, Morra, Iron Bark	14	12	12	14	12	12	14
3	(*b*) Live Oak, English, African, French, Adriatic, Italian, Spanish, and Portuguese Oaks	14	12	12	12	12	12	14
4	Pitch Pine, Oregon and Huon Pine, Larch, Hackmatack, Cowdie or Kaurie Pine ..	9	9	9	12	10	10	—
5	(*b*) Northern Continental Oak	12	9	9	12	10	10	9
6	(*b*) American White Oak	10	7	7	10	8	7	7
7	Dantzic, Memel, Riga, and American Red Pine	9	8	8	10	9	10	—
8	American Rock Elm	16	—	8	16	6	6	—
9	(*c*) English and French Elm, and Beech.....	16	—	—	16	—	—	—
10	Spruce Fir, Swedish and Norway Red Pine.....	—	—	—	8	8	—	—

(*a*) That is, two-fifths the depth of hold taken from the top of floors to the top of upper or tonnage deck beams, set up from the keel plate, in midships; which height is not to be exceeded fore and aft on a straight line.

(*b*) Live Oak, English, French, Adriatic, Italian, Spanish, and Portuguese Oak will be allowed to be used for stems, and for the bow and buttock planks where East India Teak would be liable to break in working, in vessels otherwise built of 16 years' timber material.

(*b*) Whenever any of the Oaks, or other woods of an acid nature are used, the best Hair Felt, Canvas, or other approved material, in addition to paint, is to be placed between them and the Iron Plates and Angle Irons.

(*c*) English and French Elm allowed for Garboard Strakes and Planking of flat of bottom in Ships of the 16 years' grade.

Where parties are desirous of using Woods not inserted in the Table, special application to be made to the Committee.

Lloyd's Register of Shipping, London, 29th May, 1879.

[SEE OVER.]

TONNAGE.—I
without
the hul
houses,
tonnage
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number,
vessels
tonnage
the tonr
number,

WOOD KEEL,

KEEL PLATE.

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size giv
keel pla
conform
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FRAMES.—The
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of angle
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FLOOR PLATE
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forward
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floor pla
plate to
middle l
reversed
side of t

WATERCOURS
frames,

be two-thirds the breadth of the iron sheerstrake, for three-fifths the length of the keel in essel they are to be reduced gradually to one-half their midship breadth; the thickness of hey are to be fitted at the bilges with the middle of the plate at the height prescribed for be maintained, notwithstanding that the floorheads may be carried higher. They are to be with her form, and properly rivetted to the frame.

l plates on the frames to be not less than one-third the breadth of the iron sheerstrake, and an angle of 45°, with the butts of each pair meeting between the frames; to be of the sheer and bilge strake plates by butt straps double rivetted, and to be efficiently rivetted to

lates of the thickness given in Table upon the ends of each tier of beams. Those upon the three decked vessels *to be in width one inch for every seven feet of the vessel's entire length e to the ends of the vessel they may be gradually reduced to three-fourths the width in* idships to be less than eighteen inches. The stringer plates are to be rivetted to the beams to the iron sheerstrake, with an angle iron of the dimensions given in Table, and the em. Stringer plates on the ends of beams below the upper deck may be reduced in width to deck stringer, which breadth is to extend all fore and aft, and to have an angle iron of the d aft, rivetted to reverse angle iron on each frame and to the stringer plates. In cases tringer plate on ends of hold beams is objected to, it may be reduced in width, provided such r angle irons are to be in as long lengths as possible, properly shifted, and wherever butted less than two feet long, fitted in the throat of them, properly rivetted to each flange, and e less than the angle iron they cover. Upper deck gutter waterways are to be flooded to pleted they are to be properly cemented.

ng all fore and aft upon each side of the hatchways on each tier of beams, and in addition ks in three decked or spar decked vessels, and of the upper deck in vessels of one or two e diagonally, in number one pair for about every 35 feet of the vessel's length; these plates e and a half the depth of the beams of their respective decks, and of the thickness required to each other and to the beams and stringers, and to have intermediate fastenings into the butts to be chain rivetted. Upon hold beams where a deck is not to be laid, a tie or the main frames of the ship may be fitted each side of the hatchways in lieu of tie plates, rength laterally as not to require the support given by the said angle irons or tie plates, e centre line, from opening to opening, may be substituted. All hatchways and ive half beams where required, and the latter to have mast partners at each tier of beams not to be less in thickness than is required for stringer plates, and the united breadths of diameter of the masts; these plates to be well rivetted to each other, and to the beams, and nasts are to be wedged, an angle iron of the dimensions required for the main frame of the late round the mast hole. The mast holes, skylights, and companions must be properly Where wood comings are fitted, plates are to be rivetted to the beams to which the deck ends

e of floor plates (*see Section* 13) to be one-sixteenth of an inch thicker than the plates they n in the same direction as that of the plates, and rivetted as per Section 4.

plates to which the butts of the outside planking are to be secured, must be of the breadth , efficiently rivetted thereto, and of the thickness given in Table, but on the bows and e a tendency to strain off, they are to be one-eighth of an inch thicker than therein prescribed. e best quality, and to be of the diameter as per Table, the rivet holes to be regularly and each other in the adjoining parts, from the faying surfaces in the laps, lining pieces, butt e required, the rivets not to be nearer to the butts or edges of the plating, lining pieces to o their own diameter, and not to be further apart from centre to centre than five times their er from centre to centre, and to be spaced through the frames and outside plating, and in s their diameter from centre to centre. All butts of iron plating, excepting those of poops e rivetted, and a space equal to twice the diameter of the rivets to be between each row; to twice the diameter of the rivet to be between each row, with half the number of rivets

TABLE I.

EXHIBITING THE NUMBER OF YEARS TO BE ASSIGNED TO THE DIFFERENT DESCRIPTIONS OF TIMBER USED IN

COMPOSITE SHIPS,

The same to be of good quality, properly seasoned, and free from defects.

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4	Pitch Pine, Oregon and Huon Pine, Larch, Hackmatack, Cowdie or Kaurie Pine ..	9	9	9	12	10	10	—
5	(*b*) Northern Continental Oak	12	9	9	12	10	10	9
6	(*b*) American White Oak	10	7	7	10	8	7	7
7	Dantzic, Memel, Riga, and American Red Pine	9	8	8	10	9	10	—
8	American Rock Elm	16	—	8	16	6	6	—
9	(*c*) English and French Elm, and Beech.....	16	—	—	16	—	—	—
10	Spruce Fir, Swedish and Norway Red Pine.....	—	—	—	8	8	—	—

(*a*) That is, two-fifths the depth of hold taken from the top of floors to the top of upper or tonnage deck beams, set up from the keel plate, in midships; which height is not to be exceeded fore and aft on a straight line.

(*b*) Live Oak, English, French, Adriatic, Italian, Spanish, and Portuguese Oak will be allowed to be used for stems, and for the bow and buttock planks where East India Teak would be liable to break in working, in vessels otherwise built of 16 years' timber material.

(*b*) Whenever any of the Oaks, or other woods of an acid nature are used, the best Hair Felt, Canvas, or other approved material, in addition to paint, is to be placed between them and the Iron Plates and Angle Irons.

(*c*) English and French Elm allowed for Garboard Strakes and Planking of flat of bottom in Ships of the 16 years' grade.

Where parties are desirous of using Woods not inserted in the Table, special application to be made to the Committee.

Lloyd's Register of Shipping, London, 29th May, 1879.

[SEE OVER.]

TABLE K.

Exhibiting the Sizes of Bolts, and Pintles of Rudder, in **Composite Ships.**

Tonnage.	Deadwood Keel *(b)* Stem *(a)* and Stern Post Bolts.	Bottom Plank, Scarphs of Keel, and Thwartship Garboard, Bolts.	Topside, Waterway, and Plank sheer Bolts.	Chain Plate Bolts.	Pintles of Rudder.	Tonnage.
50 and under 100	$\frac{7}{8}$	$\frac{10}{16}$	$\frac{9}{16}$	$\frac{13}{16}$	2	50 and under 100
100 and under 200	1	$\frac{10}{16}$	$\frac{9}{16}$	$\frac{7}{8}$	$2\frac{1}{4}$	100 and under 200
200 and under 300	$1\frac{1}{16}$	$\frac{12}{16}$	$\frac{10}{16}$	1	$2\frac{1}{2}$	200 and under 300
300 and under 400	$1\frac{1}{16}$	$\frac{12}{16}$	$\frac{10}{16}$	$1\frac{1}{8}$	$2\frac{3}{4}$	300 and under 400
400 and under 500	$1\frac{1}{16}$	$\frac{13}{16}$	$\frac{11}{16}$	$1\frac{1}{8}$	3	400 and under 500
500 and under 600	$1\frac{1}{8}$	$\frac{13}{16}$	$\frac{11}{16}$	$1\frac{1}{8}$	$3\frac{1}{8}$	500 and under 600
600 and under 700	$1\frac{1}{8}$	$\frac{14}{16}$	$\frac{12}{16}$	$1\frac{1}{4}$	$3\frac{1}{4}$	600 and under 700
700 and under 800	$1\frac{1}{8}$	$\frac{14}{16}$	$\frac{12}{16}$	$1\frac{1}{4}$	$3\frac{1}{2}$	700 and under 800
800 and under 900	$1\frac{3}{16}$	$\frac{15}{16}$	$\frac{13}{16}$	$1\frac{1}{4}$	$3\frac{1}{2}$	800 and under 900
900 and under 1000	$1\frac{3}{16}$	$\frac{15}{16}$	$\frac{13}{16}$	$1\frac{3}{8}$	$3\frac{5}{8}$	900 and under 1000
1000 and under 1200	$1\frac{1}{4}$	1	$\frac{14}{16}$	$1\frac{3}{8}$	$3\frac{5}{8}$	1000 and under 1200
1200 and under 1500	$1\frac{5}{16}$	1	$\frac{14}{16}$	$1\frac{3}{8}$	$3\frac{3}{4}$	1200 and under 1500
1500 and under 2000	$1\frac{6}{16}$	$1\frac{1}{16}$	$\frac{15}{16}$	$1\frac{1}{2}$	$3\frac{7}{8}$	1500 and under 2000
2000 and under 2500	$1\frac{7}{16}$	$1\frac{2}{16}$	1	$1\frac{1}{2}$	4	2000 and under 2500
2500 and under 3000	$1\frac{8}{16}$	$1\frac{2}{16}$	1	$1\frac{5}{8}$	$4\frac{1}{8}$	2500 and under 3000
3000 and under 3500	$1\frac{8}{16}$	$1\frac{3}{16}$	$1\frac{1}{16}$	$1\frac{3}{4}$	$4\frac{1}{8}$	3000 and under 3500

Tons. .....under	150	150 and under 500	500 and under 1000	1000 and under 2000	2000 and under 3000
(a) Number of Bolts in Scarphs of Keels.	6	7	8	9	10

The length of the keel scarphs to be five times the mean of the siding and moulding of the keel.

(a) Stem Scarphs are not to be less than seven-tenths the length of the Keel Scarphs, and all Scarphs are to be Tabled.

Bolts. 33.—The bolts to be not less than the sizes given in Table, the garboard strakes to be cross-bolted from side to side, with bolts not exceeding four feet six inches apart.

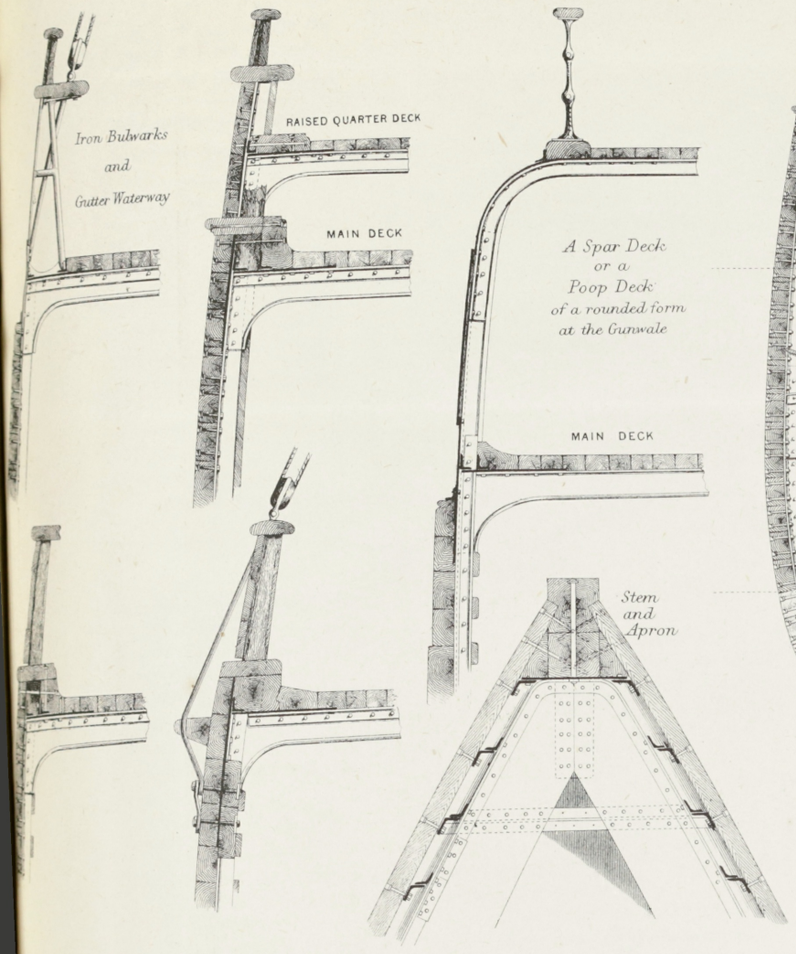
(b) The wood keel to have a vertical bolt through the keel plate between each frame. The stem, stern-post, deadwood, and remainder of the keel, to be through fastened in all cases, and the bolts spaced as in the keel. The screw pointed bolts for fastening the planking when less than five inches thick to be of such form under the heads, as will prevent them from turning, their heads to be once and three-quarters the diameter of the bolts, and two-fifths their diameter in thickness, the nuts in all cases to be of the same description of metal as the bolts they are applied to, and to be in thickness equal to their diameter, and not to have less substance than three-eighths the diameter of the bolts in any part, whatever the form may be, hexagon form being preferred. All outside planks ten inches broad and above, to be double fastened; eight inches-and-a-half and under ten inches, double and single fastened alternately; and under eight inches-and-a-half single fastened; and all butts to be double fastened. The bolt holes in the outside planking to be enlarged with a dowelling machine for the bolt heads, which in the bottom up to within one-fifth the depth of hold set down below the upper deck stringer plate are to be sunk within the surface of the planking one inch and a quarter, when dowels are intended to be used; from thence to the plank sheer they need not be sunk more than three-quarters of an inch; the bolts to be properly driven with oakum and white lead, putty, marine glue, or other suitable composition under their heads, and in the bottom they are to be carefully covered (after the seams of the bottom are all caulked) with turned well seasoned wood dowels, the fibre of which must be in the same direction as the planking, and be driven with white lead, marine glue, or any other approved composition. Where copper or yellow metal bolts are used, the sinking of them within the surface of the planking to be optional to the above extent.

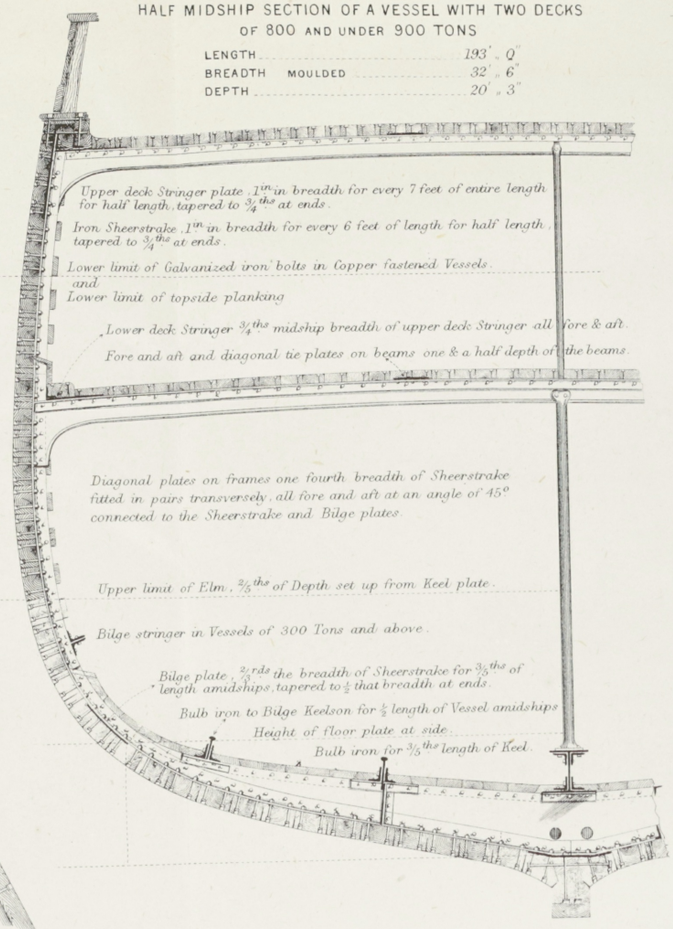
Lloyd's Register of Shipping, London, 24th February, 1870.

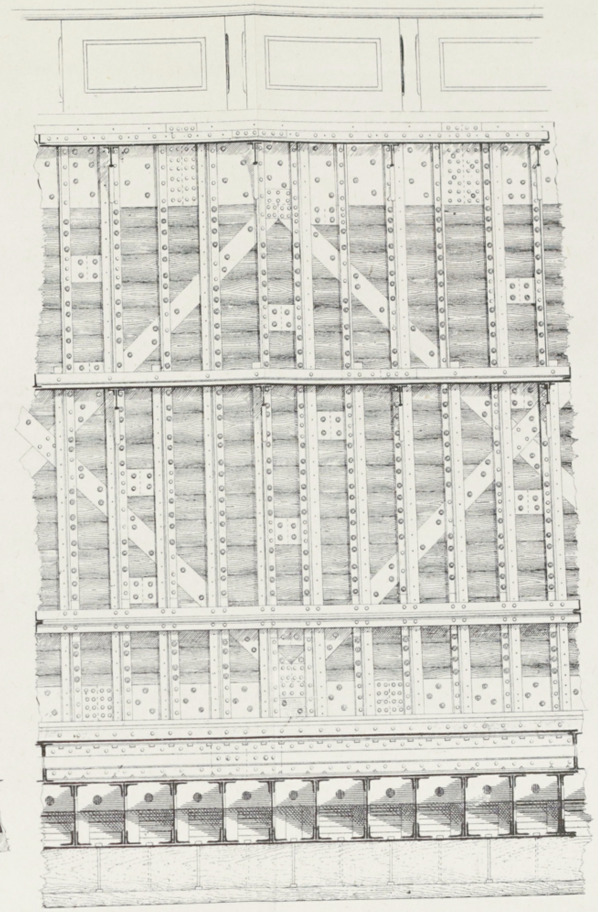
LLOYD'S REGISTER OF BRITISH AND FOREIGN SHIPPING.

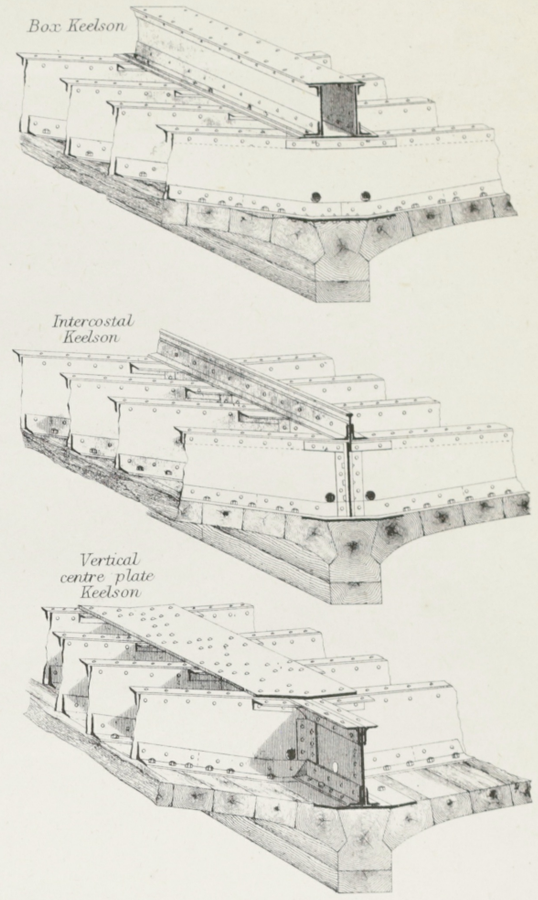
ILLUSTRATIONS OF THE SUGGESTIONS FOR THE CONSTRUCTION AND CLASSIFICATION OF COMPOSITE SHIPS

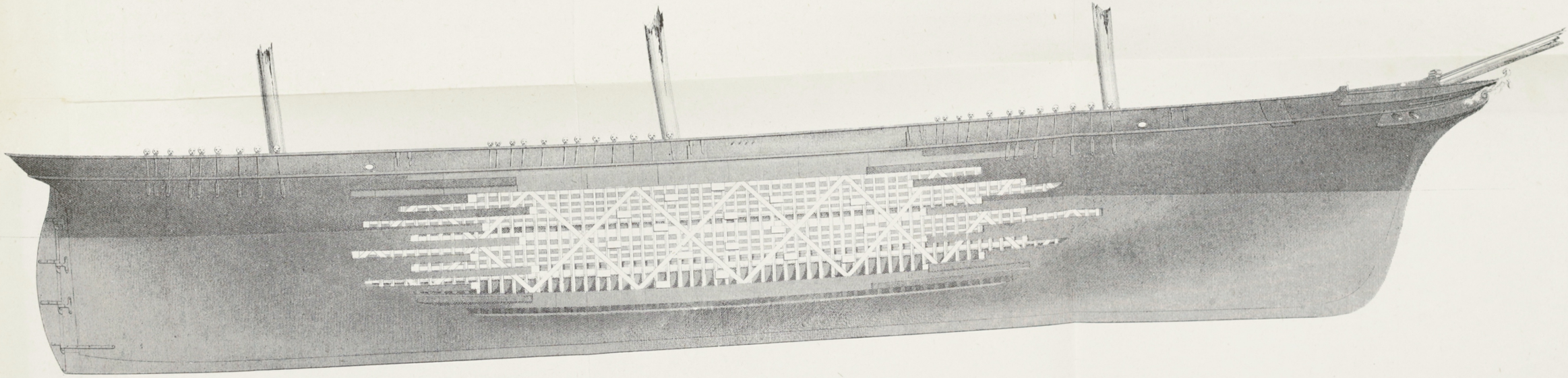
1868.











T.W.Lee. Sculp.

Printed by Robt Edmd Taylor 19 Old Street London.

by H. Cornish, Lloyd's Surveyor

FORM OF REPORT.

FORM No. 1 FOR WOOD SHIPS.—FORM OF THE REPORT OF ORIGINAL SURVEY.

No. —— Survey held at ——— Date, first survey——— Last survey——— 18—
on the ———Master ———

Official Number ———	Tonnage of houses on deck ———	Register tonnage, cut on beam ——
Tonnage under tonnage deck ——	Ditto of forecastle ———	Engine-room ———
Ditto of spar dk. or awning dk. ——	Gross tonnage———	Register tonnage, as a steamer, cut
Ditto of poop, or raised qr. dk. ——	Crew space, as per rule ———	on the beam ———

Built at ——— When built ——— Launched ——— By whom built ——— Owners ———
Port belonging to—— Destined Voyage—— If Surveyed while Building, Afloat, or in Dry Dock——

Length as per Section 39... Feet. Inches.	Extreme Breadth Feet. Inches.	Depth of Hold Feet. Inches.
Length of Keel.....	outside	

Number of Decks ——— (Depth from limber-strakes to under side of lower deck beam ———)

SCANTLINGS OF TIMBER.	IN SHIP.			REQUIRED PER RULE.		
	Sided.	Moulded. Middle.	Moulded. Ends.	Sided.	Moulded. Middle.	Moulded. Ends.
Timber and Space						
Floors						
1st Foothooks						
2nd Ditto						
3rd Ditto						
Top Timbers						
Deck Beams No. —{Average Space						
Deck Beams, length amidships						
Hold Beams No. —{Average Space						
Hold Beams, length amidships						
Keel						
Scarphs of Ditto						
Keelsons						
Scarphs of Ditto						

OUTSIDE PLANK.	Inches. In Ship.	Inches. Required per Rule.
Garboard Strakes .		
Garboard to Bilge		
Bilge Planks		
Bilge to Wales ...		
Wales.....		
Topsides.....		
Sheerstrakes		
Planksheers		
Waterways—		
Upper Deck ...		
Lower Deck ...		
Do. faying surface against Timbers		
Upper Deck		

Dimensions of Ship per Register.
length— breadth—depth—

INSIDE PLANK.	Inches. In Ship.	Inches. Required per Rule.
Limber Strakes.....		
Bilge Planks		
Ceiling in Flat		
Ditto Bilge to Clamp		
Hold Beam Clamps		
Deck Beam ditto ...		
Ceiling 'twixt Decks		
Hold Beam Shelfs		
Deck Beam ditto ...		

SIZE OF BOLTS IN FASTENINGS, DISTINGUISHING WHETHER COPPER, YELLOW METAL, OR IRON; ALSO OF TREENAILS.

	Copper or YM. in Ship.	Iron in Ship.	Inches required per Rule.
Heel-Knee and Deadwood abaft			
Scarphs of Keel, No.			
Keelson Bolts through Keel at each Floor			
Bolts through Heels of Timbers against Deadwood			
Frame Bolts			
Transoms and Throats of Hooks			
Arms of Hooks			
Through Bilge & Limber Strakes			
Thickstuff over Double Floors...			

	Copper or YM. in Ship.	Iron in Ship.	Inches required per Rule.
Butt End Bolts			
Short Bolts in Ceiling.....			
Pintles of the Rudder			
Hold Beam Bolts in { Waterway			
Hold Beam Bolts in { Knees			
Hold Beam Bolts in { Shelf or Clamp			
Deck Beam Bolts in { Waterway			
Deck Beam Bolts in { Knees			
Deck Beam Bolts in { Shelf or Clamp			
Nails or Bolts in Flat of Deck...			
Treenails —— Inches			

TIMBERING.—The Space between the Floor Timbers and Lower Foothooks is —— Inches.
The Space between the Top Timbers is —— Inches.
The Floors consist of ——— The First Foothooks of ———
The Second Foothooks of ——— The Third Foothooks and Top Timbers of ———
The Main Keelson is ——— and —— free from all defects.
The Shifts of the First and Second Foothooks are not less than ——
(The Rider Keelson is ———)
[*N.B.—When less than prescribed by the Rule, state how many.*]
The Transoms, Knight Heads, Hawse Timbers, and Aprons, of ——— Deadwood, of ——— and —— The Stem and Stern Post of ——— free from all defects.
The Deck and Hold Beams of —— The Breasthooks of —— The Knees of —— The Main piece of Rudder of ——— Windlass of ——— (The Keel of ———)

The rest of the Shifts of the Frame are —— The Frame is —— squared from the First Foot-hook Heads upwards, and —— free from sap, and from thence downwards the Frame is ——
The —— Frames are —— bolted together to the Gunwale. [*N.B.—If not, state how bolted.*]
The Butts of the Timbers are —— close together; their thickness not less than —— of the entire moulding at that place.
The Frame is —— chocked with —— Butt at each end of the chock.

PLANKING OUTSIDE.—From the top of the Keel to two-fifths the depth of Hold, the Plank is ———— From the above-named height to the Wales————
The Wales and Blackstrakes ———— The Topsides and Sheerstrakes ————
The Spirketting and Planksheers ———— The Waterways { Upper Deck ——— / Lower Deck ———
The Decks ———— State of ————
The Shifts of the Planking are not less than —— feet —— inches. [*N.B.—If less than prescribed by the Rule, state whether general or partial, and if partial, in what part of the Ship.*]
The Planking is wrought ——— between, *and without step-butting.*

PLANKING INSIDE.—The Limber-strakes and Bilgestrakes are ————
The Ceiling, Lower Hold, and between Decks ——— Shelf Pieces and Clamps ———

FASTENINGS.—To Hold Beams ———— Deck Beams ————
Number of Breasthooks ———— Pointers ———— Crutches ————
Butt End Bolts are of ——— in the Bottom ——— Bolts in each Butt End ——— through and clenched. Bilge and Limber Strakes ———— bolted through and clenched.
Treenails of ———— How made ———— Thickstuff over Double Floors ———— bolted through and clenched. General Quality of Workmanship ————

We certify that the above is a correct description of the several particulars therein given.

Builder's Signature ——— *Surveyor's Signature* ———

No.	SAILS.	CABLES, &c.	Fthms	In.	Test as per Certif.	Inches reqr'd pr. rule	Test reqr'd pr. rule	ANCHORS, &c.	No.	W'ght. ex Stock.	Test as per Certif.	W'ght reqr'd. pr. rule	Test reqr'd pr. rule
	Fore Sails,	Chain*.....											
	Fore Top Sails,	Hempen Stream Cable											
	Fore Topmast Stay	Hawser						Bowers* ...					
	Sails,	Towlines											
	Main Sails,	Warp						Stream					
	Main Top Sails, and	All of —— quality						Kedges					

* State Machine where Tested, Date or No. of Certificate, and Name of Superintendent.

Her Masts, Yards, &c. are in ——— condition, and sufficient in size and length.
Her standing and running Rigging ———— sufficient in size and ———— in quality.
She has ———— Long Boat and ———— The present state of the Windlass is ————
Capstan ———— and Rudder ———— Pumps ————

SCUPPERS, &c.—What arrangements are there beyond the scuppers on deck, for clearing upper deck of water, in case of a sea coming on board? ————

CARGO HATCHWAYS.—How formed?———— State size ———— If of extraordinary size, state how framed and secured?———— What arrangements for shifting beams? ————

HATCHES, themselves, whether strong and efficient?—— MAIN HATCHWAYS.—State size ——

Order for Special Survey, No. — Date ————
Order for Ordinary Survey, No. — Date ————
No.——in Builder's Yard.

Dates of Surveys held while building, as per Section 35.
1st. When the Frame is completed ————
2nd. When the Beams are put in, &c. ———
3rd. When completed, and before the plank be painted or payed ———

General Remarks.

Present condition of Caulking of Bottom ——— Deck ——— and Waterways ———
If Sheathed, Doubled, Felted, Coppered, or Yellow Metalled ——— When last done ———
I am of opinion this Vessel should be classed ———
The amount of the Entry Fee.....£ : : is received by me, }
Special .....£ : : ———188— } ————
Certificate..... : : *Surveyor.*
(*Travelling Expenses, if any,* £———.)
Committee's Minute ——— 18— *Character assigned* ———

FORM OF REPORT.

FORM No. 1 FOR IRON SHIPS.

No. —— Survey held at ———— Date, first survey———— Last survey————18—
on the ——— Master ———

Official number ————————————————
Tonnage under tonnage deck————————————
Ditto of third, spar, or awning deck ————————
Ditto of poop or raised quarter deck ————————
Ditto of houses on deck ————————————
Ditto of forecastle ————————————
Gross tonnage ————————————
Less crew space ————————————
Less engine-room ————————————
Register tonnage, as cut on beam ————————

ONE OR TWO-DECKED, THREE-DECKED VESSEL, SPAR, OR AWNING-DECKED VESSEL.

	Feet.
Half-breadth (moulded)	
Depth from upper part of keel to top of upper deck beams	
Girth of half midship frame (as per rule)	
1st Number	
1st Number, if a three-decked vessel deduct 7 ft.	
Length	
2nd Number	
Proportions, breadths to length	
Depths to length, upper deck to keel	
Ditto main deck ditto	

Built at —— When built —— Launched —— By whom built —— Owners —— Residence ——
Port belonging to —— Destined Voyage —— If Surveyed while Building, Afloat, or in Dry Dock ——

	Feet.	Inches.		Horse.	
Length on deck, as per rule					
Breadth, Moulded			Power of Engines		No. of Decks with flat laid ——
Depth top of Floors to Upper Deck Beams					No. of Tiers of Beams ——
Ditto Main Deck Beams					

Dimensions of Ship per Register, length ———— breadth ———— depth ————

	Inches in Ship.			Inches per Rule. (Class)		
		In Ship.		Required per Rule.		
	Inches.	Inches.	16ths.	Inches.	Inches.	16ths.
Keel, depth and thickness						
Stem, moulding and thickness						
Stern-post for Rudder, do. do.						
,, for Propeller						
Distance of Frames from moulding-edge to moulding-edge, all fore and aft						
Frames, Angle Iron, for $\frac{3}{5}$ length amidships						
,, for $\frac{1}{5}$ at each end						
Reversed Frames, Angle Iron						
Floors, depth and thickness of Floor Plate at mid line for half length amidships						
,, thickness at ends of vessel						
,, depth at $\frac{3}{5}$ the half-breadth, as per Rule						
,, height extended at bilges						
Beams, Upper, Spar, or Awning Deck, single or double Angle Iron, Plate or Tee Bulb Iron						
,, Single or double Angle Iron on upper edge						
,, Average space						
,, Main or Middle Deck, single or double Angle Iron, Plate or Tee Bulb Iron						
,, Single or double Angle Iron on upper edge						
,, Average space						
,, Lower Deck, Hold, or Orlop,—single or double Angle Iron, Plate or Tee Bulb Iron						
,, Single or double Angle Iron on upper edge						
,, Average space						
Keelsons, centre line, single or double plate, box, or intercostal, Plates						
,, Rider Plate						
,, Bulb Plate to Intercostal Keelson						
,, Angle Irons						
,, Double Angle Iron Side Keelson						
,, Side Intercostal Plate						
,, ,, Angle Irons						
,, Attached to outside plating with angle iron						
Bilge Angle Irons						
,, ,, Bulb Iron						
,, ,, Intercostal Plates riveted to plating for —— length						
,, Stringer Angle Irons						
,, Intercostal Plates riveted to plating for —— length						
Side stringer Angle Irons						

	Required In Ship.		per Rule.	
	Inches.	16ths.	Inches.	16ths.
Flat Keel Plates, breadth and thickness				
Plates in Garboard Strakes, breadth and thickness from Garboard to upper part of Bilges				
,, of doubling at Bilge, or increased thickness, and length applied				
,, from upper part of Bilge to lower edge of Sheerstrake				
,, Main Sheerstrake, breadth and thickness				
,, of doubling at Sheerstrake, and length applied				
,, from Main to Upper or Spar Deck Sheerstrake				
,, Upper or Spar Deck Sheerstrake breadth and thickness				
Butt Straps to outside plating, breadth and thickness				
Lengths of Plating				
Shifts of Plating, and Stringers				
Gunwale Plate on ends of Awning, Spar, or Upper Deck Beams, breadth and thickness				
Angle Iron on ditto				
Tie Plates (fore and aft), outside Hatchways				
Diagonal Tie Plates on Beams (No. of pairs,)				
[State clearly where plating is of alternate thickness—as distinguished from diminished thickness at ends of vessel.]				
Flat of Upper, Spar, or Awning Deck*				
How fastened to Beams				
Stringer Plate on ends of Main or Middle Deck Beams, breadth and thickness (*Is the Stringer Plate attached to the outside plating?*)				
Angle Irons on ditto (No.)				
Tie Plates, outside Hatchways				
Diagonal Tie Plates on Beams (No. of pairs,)				
Flat of Middle Deck,* ditto ditto				
How fastened to Beams				
Stringer Plates on ends of Lower Deck, Hold, or Orlop Beams (*Is the Stringer Plate attached to the outside plating?*)				
Angle Irons on ditto (No.)				
Stringer or Tie Plates, outside Hatchways				
Flat of Lower Deck				
Ceiling betwixt Decks, thickness and material				
,, in hold ditto ditto				
Main piece of Rudder, diameter at head				
,, ,, at heel				

* If Iron Deck, state if whole or part, and if wood deck is laid thereon.

(*Can the rudder be unshipped afloat?*————)

Bulkheads, No.———— No. per Rule————————

Ditto, Thickness of————————

Ditto, Height up————————

Ditto, How secured to sides of ship————————

Ditto, Size of Vertical Angle Irons,————and distance apart,————ins.

Ditto, Are the outside Plates doubled two spaces of Frames in length?————

The Frames extend in one length from ———— to ———— riveted through plates with —— in. rivets, about —— apart.

The Reversed Angle Irons on floors and frame extend————middle line to———— and to————alternately.

Keelsons. Are the various lengths of plates and angle irons properly connected? ———— And butts properly shifted?————

Plating. Garboard, double riveted to keel, with rivets —— in. diameter, averaging —— ins. from centre to centre.

„ Edges of Garboards and to upper part of bilge, worked clencher, double riveted; with rivets —— in. diameter, averaging —— ins. from centre to centre.

„ Butts from Keel to turn of Bilge, worked carvel, double riveted; with rivets —— in. diameter, averaging —— ins. from centre to centre.

„ Butts of————strakes at Bilge for————length, treble riveted with butt straps————thicker than the plates they connect.

„ Edges from Bilge to Main Sheerstrake, worked clencher, double or single riveted; with rivets —— in. diameter, averaging —— ins. from centre to centre.

„ Butts from Bilge to Main Sheerstrake, worked carvel, double riveted; with rivets —— in. diameter, averaging —— ins. from centre to centre.

„ Edges of Main Sheerstrake, double or single riveted. Upper Sheerstrake, double or single riveted.

„ Butts of Main Sheerstrake, treble riveted for————length amidships. Butts of upper or Spar Sheerstrake, treble riveted————length amidships.

„ Butts of Main Stringer Plates, treble riveted for————length amidships. Butts of Upper or Spar Stringer Plate, treble riveted for————length.

„ Breadth of laps of plating in double riveting ————. Breadth of laps of plating in single riveting ————.

Butt Straps of Keelsons, Stringer and Tie Plates, treble, double, or single riveted?————

No. of breasthooks ———— crutches ————

What description of iron is used for Frames, Beams, Keelsons, Tie and Stringer Plates, Outside Plating, &c.?————

Manufacturer's Name or Trade Mark————

The above is a correct description.

———————— *Builder's Signature.*

———————— *Surveyor's Signature.*

Workmanship.—Are the butts of plating planed or otherwise fitted?————

Do the edges of the carvel work and of the butts fay close together throughout their length without requiring any making good of deficiencies? ————

Are the fillings between the ribs and plates solid single pieces?————

Do the holes for riveting plate to frames, butt straps, or plate to plate, &c., conform well to each other? ————

Are the rivet holes well and sufficiently countersunk in the plate and punched from the faying surfaces?————

Do any rivets break into or through the seams or butts of the plating?———

Masts, Bowsprit, Yards, &c. are ——— in ——— condition, and sufficient in size and length.

If of Iron or Steel, give Scantlings of Plating, Angle Irons, &c., and further explain by a Sketch, showing how the lower Masts and Bowsprit are constructed, showing the number of Plates and Angle Irons, mode of riveting, quality of Materials, and if stamped with Maker's name.

State also Length and Diameter of Lower Masts and Bowsprit———

No.	Sails.	Cables, &c.	Fthms.	In.	Test per Certif.	Inches per rule	Machine where testd, & Suprntdt.	Anchors, &c.	No.	W'ght ex Stock.	Test per Certif.	W'ght reqr'd pr. rule	Machine where testd, & Suprntdt.
No. for Equipment———													
	Fore Sails,	Chain*.....						Bowers* ...					
	Fore Top Sails,	Iron Stream Chain or Steel Wire						Stream					
	Fore Topmast Stay Sails,	or Hempen Strm Cable						Kedge					
	Main Sails,	Towline, Hemp or Steel Wire						2nd Kedge..					
	Main Top Sails, and	Hawser											
		Warp											

* State Machine where Tested, Date or No. of Certificate, and Name of Superintendent.

Standing and Running Rigging ——— sufficient in size, and ——— in quality.

She has ——— Long Boat and ———

The Windlass is ——— Capstan ——— and Rudder ———

Pumps ———

Engine Room Skylights.—How constructed?——— How secured in ordinary weather?——

What arrangements for deadlights in bad weather?———

Coal Bunker Openings.—How constructed?——— How are lids secured?——— Height above deck?———

Scuppers, &c.—What arrangements for clearing upper deck of water, in case of shipping a sea?———

Cargo Hatchways.—How formed?——— State size Main Hatch ——— Fore-hatch ——— Quarter-hatch ——— If of extraordinary size, state how framed and secured?——— What arrangement for shifting beams?———

Hatches, if strong and efficient?

Order for Special Survey No. ——

Date ———

Order for Ordinary Survey No. ——

Date ———

No.——in Builder's Yard.

Dates of Surveys held while building, as per Section 18.

1st. On the several parts of the frame, when in place, and before the plating was wrought ———

2nd. On the plating during the process of riveting——

3rd. When the beams were in and fastened, and before the decks were laid ——

4th. When the ship was complete, and before the plating was finally coated or cemented——

5th. After the ship was launched and equipped ———

GENERAL REMARKS. (*State quality of Workmanship, &c.*)

State if one, two, or three-decked vessel, or if spar or awning decked, and the lengths of poop, bridge, forecastle, or raised quarter deck. (*If double bottom, state particulars on separate form.*)

How are the surfaces preserved from oxidation? Inside ——— Outside ———

I am of opinion this vessel should be classed ———

The amount of the Entry Fee .....£ : : is received by me, } ——— ———

Special .....£ : : ———188— }

Certificate ..... :

Travelling Expenses (if any) £———

Committee's Minute ——— 188 —

Character assigned ———

———

Surveyor.

Form No. 3 for REPORT OF ANNUAL SURVEY.

No. —— Survey held at ——— Date ——— 18 —— on the ——— Master ——— Tonnage ——— Built at ——— When built ——— By whom built ——— Owners ——————— Port belonging to ——— Destined Voyage ——— If Surveyed Afloat or in Dry Dock ——— Last Survey, No. ——— Port of —— —— Classed ———

Present condition of the

Decks	Treenails	Windlass and Capstan .....
Waterways	Breasthooks and Stemson	Pumps .....
Comings	Transoms, Pointers, and Crutches ...	Boats .....
Upper Deck Beams and Fastenings ...	Timbers of the Frame at the openings	Masts, Yards, &c. .....
Lower Deck Beams and Fastenings ...	Ditto at other places ...	Condition, how ascertained .....
Planksheers	Keelsons	Sails .....
Sheerstrakes	Clamps and Shelfs	Anchors, No. of .....
Topsides	Ceiling	Cables.....
Wales	Rudder	Hawsers and Warps .....
Plank (Bottom) and Counter	Copper .....When put on	Standing & Running Rigging .....

Caulking of Bottom, Deck, and Waterways ———

Engine Room Skylights ——— Coal Bunker, Openings, Lids, &c. ——— Scuppers ———

Cargo and Main Hatchways ——— Hatches ———

General Observations and Opinion,

Committee's Minute ——— 18

Character assigned ———

Certificate (if required).

No. 7.—FORM OF CERTIFICATE OF CHARACTER.

Lloyd's Register of British and Foreign Shipping.

ESTABLISHED 1834.

No. ——

No. 2, White Lion Court, Cornhill,

London, 18

These are to Certify, That the ——————— of ——————— ——————— Master, ——————— Tons, bound to ———————, has been Surveyed at ——————— by the Surveyors to this Society, and reported to be, on the ———————

and that she has been CLASSED and entered in the REGISTER BOOK of this Society with the Character ———————

Witness my hand,

—— ——— *Secretary.* ——————— *Chairman.*

Charge

No. 8.—FORM OF ENGINEER-SURVEYOR'S REPORT ON MACHINERY.

No.—— No. in Reg. Book. Survey held at —— Date, first Survey —— Last Survey —— 18— (Number of Visits ——) on the —— Tons —— Master —— Built at —— By whom built —— When built —— Engines made at —— By whom made —— When made —— Boilers made at —— By whom made —— When made —— Registered Horse Power —— Owners —— Port belonging to ——

ENGINES, &c.

Description of engines —— Diameter of cylinders —— Length of stroke —— No. of revolutions per minute —— Point of cut off, high pressure —— Low pressure —— Diameter of screw shaft —— Diameter of tunnel shaft —— Diameter of crank shaft journals —— Diameter of crank pin —— Size of crank webs —— Diameter of screw —— Pitch of screw —— No. of blades —— State whether movable —— Total surface —— No. of feed pumps —— Diameter of ditto —— Stroke —— Can one be overhauled while the other is at work —— No. of bilge pumps —— Diameter of ditto —— Stroke —— Can one be overhauled while the other is at work —— Where do they pump from —— No. of donkey engines —— Size of pumps —— Where do they pump from —— Are all the bilge suction pipes fitted with roses —— Are the roses always accessible —— Are the sluices on engine-room bulkheads always accessible —— No. of bilge injections —— and sizes —— Are they connected to condenser, or to circulating pump —— How are the pumps worked —— Are all connections with the sea direct on the skin of the ship —— Are they valves or cocks —— Are they fixed sufficiently high on the ship's side to be seen without lifting the stokehold plates —— Are the dischage pipes above or below the deep water-line —— Are they each fitted with a discharge valve always accessible on the plating of the vessel —— Are the blow-off cocks fitted with a spigot and brass covering plate —— What pipes are carried through the bunkers —— How are they protected —— Are all pipes, cocks, valves, and pumps in connection with the machinery accessible at all times —— Are the pipes, cocks, and valves arranged so as to prevent an unintentional connection between the sea and the bilges —— When were stern tube, propeller, screw shaft, and all connections examined in dry dock —— Is the screw shaft tunnel watertight —— and fitted with a sluice door —— worked from ——

BOILERS, &c.

Number of boilers —— Description —— Whether steel or iron —— Working pressure —— Tested by hydraulic pressure to —— Date of test —— Description of superheating apparatus or steam chest —— Can each boiler be worked separately —— Can the superheater be shut off and the boiler worked separately —— No. of square feet of fire grate surface in each boiler —— Description of safety valves —— No. to each boiler —— Area of each valve —— Are they fitted with easing gear —— No. of safety-valves to superheater —— Area of each valve —— Are they fitted with easing gear —— Smallest distance between boilers and bunkers or woodwork —— Diameter of boilers —— Length of boilers —— Description of riveting of shell, long. seams —— Circum. seams —— Thickness of shell plates —— Diameter of rivet holes —— Whether punched or

drilled —— Pitch of rivets —— Lap of plating —— Percentage of strength of longitudinal joint —— Working pressure of shell by rules —— Size of manholes in shell —— Size of compensating rings —— No. of furnaces in each boiler —— Outside diameter —— Length, top —— bottom —— Thickness of plates —— Description of joint —— If rings are fitted —— Greatest length between rings —— Working pressure of furnace by the rules —— Cumbustion chamber plating, thickness, sides —— back —— top —— Pitch of stays to ditto, sides —— back —— top —— If stays are fitted with nuts or riveted heads —— Working pressure of plating by rules —— Diameter of stays at smallest part —— Working pressure of ditto by rules —— End plates in steam space, thickness —— Pitch of stays to ditto —— How stays are secured —— Working pressure by rules —— Diameter of stays at smallest part —— Working pressure by rules —— Front plates at bottom, thickness —— Back plates, thickness —— Greatest pitch of stays —— Working pressure by rules —— Diameter of tubes —— Pitch of tubes —— Thickness of tube plates, front —— back —— How stayed —— Pitch of stays —— Width of water spaces —— Diameter of superheater or steam chest —— Length —— Thickness of plates —— Description of longitudinal joint —— Diameter of rivet holes —— Pitch of rivets —— Working pressure of shell by rules —— Diameter of flue—— Thickness of plates —— If stiffened with rings —— Distance between rings —— Working pressure by rules —— End plates of superheater or steam-chest, thickness —— How stayed —— Superheater or steam-chest, how connected to boiler ——.

DONKEY BOILER.

Description —— Made at —— By whom made —— When made —— Where fixed —— Working pressure —— Tested by hydraulic presure to —— No. of certificate —— Fire grate area —— Description of safety valves —— No. of safety valves —— Area of each —— If fitted with easing gear —— If steam from main boilers can enter the donkey boiler —— Diameter of donkey boiler —— Length —— Description of riveting —— Thickness of shell plates —— Diameter of rivet holes —— Whether punched or drilled —— Pitch of rivets —— Lap of plating —— Percentage of strength of joint —— Thickness of crown plates —— Stayed by —— Diameter of furnace, top —— bottom —— Length of furnace —— Thickness of plates —— Description of joint —— Thickness of furnace crown plates —— Stayed by —— Working pressure of shell by rules —— Working pressure of furnace by rules —— Diameter of uptake —— Thickness of plates —— Thickness of water tubes ——

SPARE GEAR. State the articles supplied ——

The foregoing is a correct description,

————————————Manufacturer.

GENERAL REMARKS. State quality of workmanship, opinions as to class, &c. ——

Engineer-Surveyor to Lloyd's Register of Shipping.

Form No. 10.—FORM OF CERTIFICATE OF LLOYD'S M.C. FOR BOILERS AND ENGINES.

Lloyd's Register of British and Foreign Shipping.

ESTABLISHED 1834.

No. ——

No. 2, White Lion Court, Cornhill,

London, 188

These are to Certify, That the Engines and Boilers of the ———— of ———— Master ———Tons, have been surveyed at————by the Engineer-Surveyors to this Society, and reported to be on the ———— in good, efficient, and safe working condition, and that the Record L.M.C.——— (Lloyd's Machinery Certificate), has been made in the Register Book accordingly.

Witness my hand,

————*Chairman.*

————*Secretary.*

Charge

Form No. 11.—FORM OF CERTIFICATE OF B.&M.S. FOR BOILERS AND ENGINES.

Lloyd's Register of British and Foreign Shipping.

ESTABLISHED 1834.

No. ——

No. 2, White Lion Court, Cornhill,

London, 188

These are to Certify, That the Boilers and Machinery of the ———— of ———— Master ———Tons, have been surveyed at————by the Engineer-Surveyors to this Society, and reported to be on the————in good and efficient condition, and that the Record B.&M.S. (in red)———(Boilers and Machinery Surveyed), has been made in the Register Book accordingly.

Witness my hand,

————*Chairman.*

————*Secretary.*

Charge

CIRCULAR, No. 305.

AWNING-DECKED STEAMERS.

It being a condition in the Rules of Lloyd's Register of British and Foreign Shipping, that "*in Awning-decked vessels there must be scuppers and ports at the main deck through the side, to discharge water*," and it having come to the knowledge of the Committee that in certain cases the scuppers and ports have been permanently closed, in contravention of the above Regulation, and the Committee having expunged the Character assigned to a vessel which has been so dealt with :—

NOTICE IS HEREBY GIVEN to the owners of Awning-decked Vessels classed in Lloyd's Register Book, that in any cases brought to the knowledge of the Committee of the closing of the scuppers or the securing of the ports in such vessels, contrary to the Regulation in question, they will immediately suspend the Character assigned to them.

By order of the Committee,

LLOYD'S REGISTER OF BRITISH AND FOREIGN SHIPPING, BERNARD WAYMOUTH, *Secretary.*

No. 2, White Lion Court, Cornhill, London, E.C., 27th February, 1873.

No. 314.

AWNING-DECKED VESSELS.

NOTICE IS HEREBY GIVEN that, with reference to the Rule requiring that "*in Awning-decked vessels there must be scuppers and ports at the main deck through the side, to discharge water*," the Committee have passed the following Resolutions, viz :

"In the case of the vessels *now* building, provided *every* frame be extended to the awning deck and a load-line submitted to the Committee be aproved by them, ports and scuppers may be dispensed with."

"In all cases in which, in consequence of a *load-line* having been agreed upon as the ground for dispensing with ports and scuppers, should the vessel's draught in *salt water* exceed that indicated by the load-line, she shall cease to be entitled to a class in the Register Book, whilst so loaded ; and in all cases where a class has been assigned to a vessel having ports and scuppers, such class will be forfeited if the ports and scuppers be closed."

"The load-line so agreed to by the General Committee is to be inserted in the *Certificates* and in the *Register Book*."

"Awning-decked Ships which have *already* been allowed to have ports and scuppers closed, are to have their load-line inserted in their Certificates of Classification, and recorded in the Register Book."

By order of the Committee,

No. 2, White Lion Court, Cornhill, London, E.C., 21st August, 1873. BERNARD WAYMOUTH, *Secretary.*

CIRCULAR, No. 340.

AWNING-DECKED STEAMERS.

LLOYD'S REGISTER OF BRITISH AND FOREIGN SHIPPING,

..... *No. 2, White Lion Court, Cornhill, London, E.C., 8th December*, 1875.

With reference to the Notices, numbered 305 and 314, issued by the Committee of this Society in February and August, 1873, calling attention to the conditions under which Awning-decked Vessels are classed in the Register Book, I am directed, in forwarding to you copies of those Notices, to acquaint you that the Committee, having become aware that the condition on classification, that the Ports and Scuppers at the main deck must remain open for the discharge of water, continues to be contravened, have resolved, that in *all* cases of Awning-decked Vessels classed in the Register Book, a load-line shall be determined on for them, to be marked on the Ship's side, and recorded in the Register Book and on the Certificate of Classification.

Under these circumstances, I am to request you will submit to me for the Committee's consideration the load-line you suggest for adoption in the case of your Iron Screw Steamer.....

I have to add, that in every instance of non-compliance with this requirement within six months of the date hereof, the character of the vessel will be expunged from the Register Book. I am,.....

Your obedient Servant,

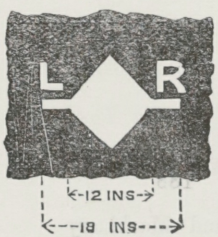
(*Signed*) B. WAYMOUTH, *Secretary.*

CIRCULAR, No. 354.

AWNING-DECKED STEAMERS.

LLOYD'S REGISTER OF BRITISH AND FOREIGN SHIPPING,

No. 2, White Lion Court, Cornhill, London.



To be White or Yellow on a dark ground, or black on a light ground.

....

With reference to the Circular Letter, numbered 340, issued by the Committee of this Society in December, 1875, conveying their Resolution, that in all cases of Awning-decked Vessels classed in the Register Book, a load-line shall be determined on for them, to be marked on the ship's sides, and recorded in the Register Book and on the Certificate of Classification, I am to acquaint you that the Committee having understood that the above requirement as to the marking of the load-line on the ship's sides has not in all cases been complied with, they hereby call attention thereto ; and I am to add that the mark decided upon by the Committee, to be painted on each side of ths ship as nearly amidships as practicable, shall be a diamond with a bar at each end, having the letter **L** above the left bar and the letter **R** above the right bar, as herein illustrated.

The centre of the bar to be the load-line. I am,.....

Your obedient Servant,

B. WAYMOUTH, *Secretary.*

CIRCULAR, No. 369.

AWNING-DECKED STEAMERS.

LLOYD'S REGISTER OF BRITISH AND FOREIGN SHIPPING,

..... *No. 2, White Lion Court, Cornhill, London, E.C., 4th January*, 1877.

I beg to refer you to my letter of the 8th December, 1875, with its enclosures (and of which I now transmit copies), acquainting you with the Committee's determination to expunge from the Register Book the Character assigned therein to the Awning-decked Screw Steamer.....unless a load-line be approved by the Committee for this vessel, and be marked on the ship's sides, and recorded in the Register Book and on the Certificate of her Classification ; and I am to add that in the absence of a reply thereto, the Committee feel it to be out of their power to continue the character of the vessel in the Register Book, and that unless a satisfactory reply be received prior to the reprinting of the book in April next, the vessel's character will be expunged therefrom by a red line.

I at the same time enclose a circular letter, Numbered 354, showing the form of mark decided on by the Committee for the ship's sides. I am,.....

Your obedient Servant,

B. WAYMOUTH, *Secretary.*

[*See also Circulars on next page.*

No. 472*

LLOYD'S REGISTER OF BRITISH AND FOREIGN SHIPPING.

FREEBOARD.

AWNING-DECKED VESSELS.

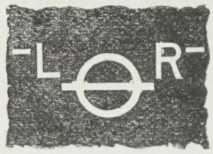
With reference to Notice No. 471*, on the Freeboard of Vessels,

NOTICE is hereby given that, in regard to awning-decked vessels already classed or being built for classification in the Society's Register Book, the Owners of such vessels will be allowed the option either of retaining the mark prescribed in Circular No. 354 for indicating the load line of awning-decked vessels, or of having their vessels marked in accordance with the conditions of the following paragraphs, numbered 1, 2, and 3.

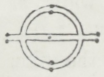
In respect to awning-decked vessels built, or contracted for, after six months from the date of this notice, the marking as prescribed in Circular No. 354 will be discontinued, and to entitle vessels of this description to classification in the Society's Register Book, the following conditions shall be complied with, in addition to the requirements set forth in Section 43 of the Society's Rules for Iron Vessels, viz. :—

1.—The maximum load-line in *salt* water determined by the Committee shall be adopted by the Owner as the load-line required by the Merchant Shipping Act of 1876 to be marked on the sides of the vessel.

2.—The maximum draught in *fresh* water will also be determined by the Committee, and is to be indicated by marks painted above the maximum load-line in *salt* water, as shown in the illustration to the following paragraph.



3.—The letters **L R** shall be painted on the sides of the vessel, one before and the other abaft the bar passing through the disc required by Act of Parliament, as per sketch, and the position of the disc and bar shall be further permanently shown by centre-punch marks, thus :—



The Freeboard to the main deck and awning deck, as defined by the position of the maximum load-line in salt water, will be recorded in the Society's Register Book.

By Order of the Committee,
BERNARD WAYMOUTH,
Secretary.

No. 2, White Lion Court, Cornhill, London, E.C.
11th January, 1883.

N.B.—It is a condition on which an awning-decked vessel is classed in the Society's Register Book that the freeboard assigned shall be marked on the vessel's sides as above prescribed; and, under the provisions of Section 43 of the Society's Rules for Iron Ships, if the vessel be loaded to a greater draught of water than that assigned by the Committee, or if the mark indicating the maximum load draught be placed higher than the position assigned by the Committee, the vessel will thereby forfeit her Character in the Register Book.

No. 471*

LLOYD'S REGISTER OF BRITISH AND FOREIGN SHIPPING.

FREEBOARD.

The Committee of this Society have for some time past given the subject of the Freeboard of Ships serious consideration with a view to assigning maximum load-lines to all types or classes of vessels, and have used all available means to arrive at a satisfactory basis on which to deal with a question so important to the Mercantile Marine.

Having completed their deliberations on the subject, the General Committee, at a recent special meeting, comprising members representing various ports of the country, gave their approval generally to the system embodied in the Tables and Rules, dated 10th August, 1882, submitted to them as a basis for determining a load-line for any description of vessel.

NOTICE is therefore hereby given that, on and after the 1st October, 1882, the Committee when requested by the owner of a vessel, whether she be classed in the Society's Register Book or not, to assign to her a load-line, will be prepared to accede to such request, provided the following conditions be complied with, viz. :—

1.—The request shall be in writing.

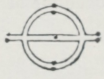
2.—The Owner shall state in the form of request what in his own opinion would be a suitable load-line for the vessel for which he wishes the Committee to determine a Freeboard.

3.—The vessel shall, if required, be surveyed in dry dock by one of the Society's Surveyors, who will report to the Committee before the load-line is determined.

4.—The maximum load-line in *salt* water determined by the Committee shall, if accepted by the Owner, be adopted by him as the load-line required by the Merchant Shipping Act of 1876 to be marked on the sides of the vessel.

5.—The maximum draught in *fresh* water will also be determined by the Committee, and is to be indicated by marks painted above the maximum load-line in *salt* water, as shown in the illustration to the following paragraph.

6.—The letters **L R** shall be painted on the sides of the vessel, one before and the other abaft the bar passing through the disc required by Act of Parliament, as per sketch, and the position of the disc and bar shall be further permanently shown by centre-punch marks, thus :—



The Freeboard to the main deck or spar deck, as the case may be, and to the main deck and awning deck in awning-decked vessels, as defined by the position of the maximum load-line in salt water, will be recorded in the Society's Register Book.

By Order of the Committee,

BERNARD WAYMOUTH,

No. 2, White Lion Court, Cornhill, London, E.C. *Secretary.*

11th January, 1883.

N.B.—The Freeboard assigned by the Committee is not to be considered suitable or sufficient if the vessel be engaged in the North Atlantic trade sailing to, or from the Mediterranean or any European port, or sailing from, or calling at ports in British North America or eastern ports in the United States north of and including Baltimore, from October to March inclusive, but should be increased as provided for in the Tables of Freeboard.

No. 477.

LLOYD'S REGISTER OF BRITISH AND FOREIGN SHIPPING.

EXPIRATION OF CHARACTER OF SHIPS CLASSED A, A IN RED, Æ AND E.

NOTICE IS HEREBY GIVEN, that in pursuance of the Rules, Section 59 (as set forth below), and of a Resolution passed this day by the Committee of Lloyd's Register of British and Foreign Shipping :—

"All Ships classed A for a term of years, will, at the expiration of such term (or so soon after as may be practicable) have the word '*expired*' inserted against their names in the Register Book, and if not surveyed and re-classed prior to the reprinting of the Register Book for issue in July next, will appear therein without character."

The foregoing Resolution will likewise apply to Ships classed A in Red, Æ and E, whose period of exemption from special re-survey will terminate on the 31st December.

By order of the Committee,

BERNARD WAYMOUTH,

No. 2, White Lion Court, Cornhill, London, E.C., *Secretary.*
2nd November, 1882.

EXTRACT FROM THE RULES, SECTION 59.

"At the termination of the several periods assigned to ships for remaining on the character A, or A in Red, they will have the word '*expired*' inserted against them; and if not surveyed prior to the reprinting of the Register Book, they will appear without any character."*

* The terms of years assigned to ships on the character A, launched *previously to the 1st of July*, 1859, also of ships launched during the *first* six months of the years 1860, 1861, 1862, and 1863, will expire on the 31st December of the last year of the periods assigned to them respectively.

The terms assigned to ships launched during the *last* six months of the years 1859, 1860, 1861, and 1862, will expire on the 30th June next after the last year of the periods assigned to them respectively.

In the case of ships launched on and after the 1st July, 1863, the period originally assigned to them on the A character, will in every case *date from the month* in which the vessel may be launched, and will expire at the end of the corresponding month in the year at which the period assigned terminates.

No. 478.

SHIPS CLASSED A IN RED, Æ OR E.

The Rules, Sections 60, 61 and 62, requiring that Ships classed A in Red, Æ or E, shall be surveyed *annually*, or on their return from every Foreign voyage :—

NOTICE IS HEREBY GIVEN, that in accordance with the above Rules, and in pursuance of a Resolution passed this day by the Committee, the Characters of Ships classed A in Red, Æ or E, which shall not have been surveyed since the year 1880, will be omitted in reprinting the Register Book for issue in July, 1883.

By order of the Committee,

BERNARD WAYMOUTH,

No. 2, White Lion Court, Cornhill, London, E.C., *Secretary.*
2nd November, 1882.

N.B.—In the case of Ships which it shall be made to appear, by letter addressed to the Secretary, have not been in any Port in the United Kingdom, since 1880, the above Resolution will not be applied.

No. 419 (*continued*).

FLAT PLATES.

The strength of flat plates supported by stays to be taken from the following formula :—

$$\frac{C \times T^2}{P^2} = \text{working pressure in lb. per square inch.}$$

where T = thickness of plate in sixteenths of an inch.
P = greatest pitch in inches.
C = 90 for plates $\frac{7}{16}$ thick and below fitted with screw stays with riveted heads.
C = 100 for plates above $\frac{7}{16}$ fitted with screw stays with riveted heads.
C = 110 for plates $\frac{7}{16}$ thick and under fitted with screw stays and nuts.
C = 120 for plates above $\frac{7}{16}$ fitted with screw stays and nuts.
C = 140 for plates fitted with stays with double nuts.
C = 160 for plates fitted with stays with double nuts, and washers at least $\frac{1}{2}$ thickness of plates and a diameter of $\frac{2}{5}$ of the pitch, riveted to the plates.

NOTE.—In the case of front plates of boilers in the steam space, these numbers should be reduced 20 per cent., unless the plates are guarded from the direct action of the heat.

GIRDERS.

The strength of girders supporting the tops of combustion chambers and other flat surfaces to be taken from the following formula :—

$$\frac{C \times d^2 \times T}{(L-P) \times D \times L} = \text{working pressure in lb. per square inch.}$$

where L = length of girder.
P = pitch of stays.
D = distance apart of girders.
d = depth of girder at centre.
T = thickness of girder at centre. All these dimensions to be taken in inches.

C = 6,000, if there is one stay to each girder.
9,000, if there are two or three stays to each girder.
10,200, if there are four stays to each girder.

CIRCULAR FURNACES.

The strength of plain furnaces to resist collapsing to be calculated from the following formula :—

$$\frac{89{,}600 \times T^2}{L \times D} = \text{working pressure in lb. per square inch.}$$

where 89,600 = constant.
T = thickness of plates in inches.
D = outside diameter of furnace in inches.
L = length of furnaces in feet. If rings are fitted, the length between rings to be taken.

The pressure in no case to exceed $\frac{8000 \times T}{D}$

No. 419 (*continued*).

The strength of the corrugated furnaces (corrugations $1\frac{1}{2}$ inches deep) to be calculated from the following formula :—

$$\frac{1000 \times (T-2)}{D} = \text{working pressure in lb. per square inch,}$$

where T = thickness of plates in sixteenths of an inch,
D = greatest diameter of furnace in inches.

DONKEY BOILERS.

The iron used in the construction of the fire boxes, uptakes, and water tubes of donkey boilers shall be of good quality, and to the satisfaction of the Surveyors, who may in any cases where they deem it advisable apply the following tests :—

Thickness of Plates.	To Bend cold through an angle of	
	With the Grain.	Across the Grain.
$\frac{5}{16}$	80°	45°
$\frac{6}{16}$	70°	35°
$\frac{7}{16}$	55°	25°
$\frac{8}{16}$	40°	20°

The material to stand bending *hot* to an angle of 90 degrees, over a radius of not greater than $1\frac{1}{2}$ times the thickness of the plates.

By Order of the Committee,

BERNARD WAYMOUTH,
Secretary.

No. 2, White Lion Court, Cornhill, London, E.C.,
7th June, 1883.

No. 432.

LLOYD'S REGISTER OF BRITISH AND FOREIGN SHIPPING.

ANCHORS AND CABLES.

STEEL WIRE CABLES.

TABLE No. 22.

NOTICE.

NOTICE IS HEREBY GIVEN, that the Committee are prepared to sanction the supply of one flexible steel wire cable in steam vessels for which classification in the Society's Register Book is contemplated, in the place of one of the chain cables, provided the following conditions be complied with, namely :—

That the size of, and the proposed tests for, the steel wire cable be in the first place submitted to the Committee and receive their approval.

That the mode of attaching the steel wire cable to the anchor, the proposed weight and shape of the anchors intended to be used, and the nature of the proposed appliances for working the steel wire cables to be in the first instance submitted for the consideration and approval of the Committee, and that in the case of a steel wire cable being supplied, a notation be made after the name of the vessel of *steel wire cable exp'l.*

Table No. 22 has also been amended in the columns for stream chains, towlines, hawsers, and warps. See also the foot-note thereto.

By Order of the Committee,
BERNARD WAYMOUTH,
Secretary.

No. 2, White Lion Court, Cornhill, London, E.C.
3rd June, 1880.

No. 437.

LLOYD'S REGISTER OF BRITISH AND FOREIGN SHIPPING.

No. 2, White Lion Court, Cornhill, London, E.C.
12th August, 1880.

HAWSERS AND WARPS.

SIR,

With reference to the foot-note added, as per Notice, No. 432, dated 3rd June, 1880, to Table No. 22, to the effect that "Where a departure from the requirements of the Table for hawsers and warps is proposed, the same should be in all cases submitted in the first place for the approval of the Committee," I am directed to acquaint you that in the case of vessels built after the above date, the Committee will require an adherence to the equipment prescribed in the Table, unless their sanction for a departure therefrom has been previously obtained; and I am to request you will, in the event of your becoming aware of proposed departures from the Rules, lose no time in apprising the builders of the vessel of the above conditions.

I am to add, that in any case it is the duty of the Surveyor to draw the Committee's attention, either by letter or on his report on the vessel, to any departures from the Rules, with such remarks as he may have to offer thereon.

I am, Sir,

Your obedient Servant,

BERNARD WAYMOUTH,

Secretary.

The Surveyor,

Lloyd's Register of Shipping.

No. 453.

LLOYD'S REGISTER OF BRITISH AND FOREIGN SHIPPING.

LARGE FORGINGS FOR SHIPS AND ENGINES.

The Committee of this Society have recently had under consideration the subject of the inspection of large forgings used in the construction of ships and engines; and, in view of the fact that it is the practice of many Shipbuilders and Engineers to have them delivered in a finished state, when imperfections which may exist cannot be readily discovered, the Committee consider it desirable that all large forgings intended for ships or engines being built under the inspection of the Society's Surveyors, should be examined by the Surveyors while in course of being forged, and, in addition, in the case of shafts when being rough turned, in which condition defects are more perceptible.

In order that the necessary arrangements may be made in each case, Shipbuilders and Engineers are desired to communicate to the Society's local Surveyors, at an early stage in the progress of the work, all needful particulars as to where and of what material the forgings in question are being manufactured.

By Order of the Committee,

BERNARD WAYMOUTH,

Secretary.

No. 2, White Lion Court, Cornhill, London, E.C.,

8th December, 1881.

No. 488.

LLOYD'S REGISTER OF BRITISH AND FOREIGN SHIPPING.

LARGE FORGINGS.

With reference to Notice No. 453, of the 8th December, 1881, on the subject of the inspection of large forgings, intended to be used in the construction of ships or engines proposed to be built under the survey of the Surveyors to this Society, the Committee have recently had under consideration some cases in which, owing to the omission of the Shipbuilders and Engineers to give early intimation to the local Surveyors, of the intended manufacture of the forgings, the requisite inspection at the works could not be made by the Society's officers.

The Committee, therefore, think it right, in order to obviate any inconvenience in future, to suggest that in all cases Shipbuilders and Engineers should furnish the local Surveyors with all necessary information *when the orders for such forgings are issued.*

By Order of the Committee,

B. WAYMOUTH,

Secretary.

No. 2, White Lion Court, Cornhill, London, E.C.,

25th January, 1883.

No. 499.

LLOYD'S REGISTER OF BRITISH AND FOREIGN SHIPPING.

ALTERATIONS AND AMENDMENTS MADE IN THE RULES OF THE SOCIETY BY THE GENERAL COMMITTEE.

Alterations have been made in the Rules for the Building and Classification of Ships in the following sections thereof, viz., in

IRON SHIPS.

STERNPOST, &c.

Section 5, *page* 61.—The following additional paragraph has been inserted, preceding the last paragraph:—

"The sternpost is to be extended well above the counter, and securely attached at its head to an iron deck or plate, and to a transom plate which should not be less in depth than once and a half the depth of the midship floor plate, and of the same thickness. And in screw steamers whose plating number is 20,000 and above, the foremost or propeller post should extend to the height of the middle deck, and be efficiently connected to it, or to iron plating on the beams, and to a deep transom plate."

The following paragraph has been altered as follows:—

"The rudder braces are to be forged on the sternpost, and spaced from 4 feet to 5 feet 6 inches."

FRAMES.

Section 6, *page* 61.—The following addition has been made to the last paragraph of this section:—"which spacing should not be exceeded around the stern of the vessel at the knuckle."

REVERSED ANGLE IRONS ON FRAMES.

Section 8, *page* 63.—The following paragraph has been added to this section:—

"In vessels where the plating number is 20,000 and above, reversed angle irons should be fitted to every frame to the height of the upper or spar deck abaft the after peak bulkhead; and in addition where such vessels have broad flat counters, a double angle iron stringer should be fitted midway between the middle and upper or spar deck beams for a reasonable length, connected by plate knees to the transom plate."

MIDDLE LINE KEELSONS.

Section 9, *page* 64, *paragraph* 2.—The following is to follow "top of floors," in 5th line, "or connected to the centre through plate."

BEAMS.

Section 13, *page* 66.—The following paragraph is to follow paragraph 1 :—

"In sailing ships where the length of the midship hold beam exceeeds 39 feet, the hold beams should be one inch more in depth than prescribed in Table G 3, unless they be additionally pillared."

The last paragraph of this section is to read as follows :—

"If the beams of the several decks in *steam* vessels of 43 feet, &c.

SPACING OF BEAMS, &c.

Section 14, *page* 66.—This section is altered as follows :—

Paragraph 1.—"The spacing of beams, or the arrangement of stringers substituted for beams, is to be regulated by the depth admidships measured from the upper part of floor plates of the depth given in Table G 1, to the top of the upper, spar, or awning deck beams."

Section 14, *page* 67, *paragraph* 9.—"Sailing vessels of 18 and under 21 *feet* in depth," &c.

Paragraph 10.—"Sailing vessels of 21 *and under* 22 *feet* in depth from the upper part of the upper deck beams, or of 14 *and under* 15 *feet*," &c.

Paragraph 11.—"Sailing vessels of 22 *and under* 24 *feet* in depth from the upper part of the upper deck beams, or 15 and under 16 feet," &c.

Section 14, *page* 68.—Between last paragraph, page 67, and 1st paragraph, page 68, the following is inserted :—

"Sailing vessels of 24 and under 25 feet in depth from the upper deck beams, or 16 and under 17 feet in depth from top of lower deck beams, to have the lower deck beams fitted to every alternate frame, and instead of bulb plates (as above described) to have plates 12 in. by $\frac{10}{16}$ in. fitted between the two double angle iron side stringers, with double angle irons of the size required for keelsons, fitted on their inner edge, extending for a similar length."

Paragraph 5.—After the words "double angle irons of" in second line, the words "each of" have been introduced to render the meaning more clear.

PILLARS.

Section 15, *page* 70.—The 4th paragraph amended and to read as follows :—

"Pillars which extend from the keelson to the upper deck beams in vessels with two decks, or tiers of beams; or to the middle deck beams in vessels with three decks, or tiers of beams; and the hold pillars in sailing ships of 22 feet depth of hold and above, are to have their diameter increased by three-eighths of an inch beyond that given in Table G 1."

TIE PLATES ON BEAMS.

Section 17, *page* 72.—Paragraph 3 of this section to be omitted.

HOOKS AND CRUTCHES.

Section 18, *page* 72.—In paragraph 1 of this section, after "crutches" the following is inserted :—

"of the same thickness as the floor plates amidships, and those below the hold beams should be spaced about four feet apart. In vessels whose plating number is 24,000, or above, an additional hook or crutch should be fitted at the ends of the vessel, between each tier of beams."

PLATING.

Section 19, *page* 73.—The following to be added to paragraph 1 :—

"and when the plating number is 22,000 and above, the strake of plating in way of the hold beams is to be increased one-sixteenth of an inch in thickness, for one-half the vessel's length amidships."

Paragragh 12.—This paragraph to read as follows :—

"The outside plating, if not less than six-sixteenths of an inch in thickness amidships, may be reduced one-sixteenth of an inch for a fourth of the vessel's length at each end. But the garboard strakes and boss plates in all screw steamers, and also the after hoods of plating connected to the stern frame, where the plating number is 16,600 and above, must be retained of the thickness required for the same strakes amidships."

BULKHEADS.

Section, 22, *page* 76.—Paragraph 1 of this section to read as follows :—

"Screw propelled vessels, in addition to the engine room bulkheads, to have a watertight bulkhead built at a reasonable distance from each end of the vessel. In steamers 280 feet long and above, an additional bulkhead is to be fitted in the main hold about midway between the collision and engine room bulkheads, *and extending to the upper deck in vessels with one, two, or three decks, and to the spar deck in spar-decked vessels, and to the main deck in awning-decked vessels;* and in steamers of 330 feet long and above, an additional bulkhead is to be fitted in the after-hold extending to the same height."

Section 22, *page* 77.—Paragraph 2 from top, to read as follows in second line :—

"two or three decks, and to the spar deck in spar-decked vessels, and main deck in awning-decked vessels."

And paragraph 5 from top to read as follows :—

"The bulkheads to be supported vertically on one side, and horizontally on the other, with angle irons of not less size than required for the *main* frames. The vertical angles to be not more than two feet six inches apart, and on the opposite side of the bulkheads the horizontal angles should not exceed four feet apart below where they are supported by a laid deck. In vessels of forty feet breadth and above, the engine room bulkheads should be additionally strengthened by a vertical web at the middle line, extending from the keelson to the hold beams, or by other means, to the satisfaction of the committee. All such bulkheads to be caulked and made thoroughly watertight."

DOUBLE BOTTOMS.

The following amendments and additions have been made in Section 24 of the Rules for Iron Ships respecting "Double Bottoms."

Section 24. Vessels fitted with a double bottom for the purpose of water-ballast extending throughout the whole or part of the length of the vessel, will have the same denoted in the Register Book, together with its length and capacity. (*See* Key to Register Book.)

Side intercostal plates or side keelsons need not be fitted in the range of double bottoms; but, where partial double bottoms are fitted, these keelsons are to extend into, or scarph the double bottoms not less than three spaces of frames, and be connected to the longitudinal girders where practicable.

"Manholes," with wrought-iron covers, must be constructed, or provision made for the removal of a portion of the plates so as to enable the inner surface of outside plating, the frames, floors, keelsons, and rivets to be thoroughly examined and coated when required, and in way of the manholes in the inner bottom plating, doubling plates or rims should be fitted to receive the fastening of the covers. The double bottom to be made water-tight, and all water-tight joints to be tested on completion with a head of water at least equal to the extreme draught of water of the vessel.

All water-tight joints to have the surfaces of iron fitted close to each other and caulked, without, as far as practicable, the use of felt, canvas, &c.

The upper side of the plating must be protected with wood planking as ceiling, in no case to be less than $2\frac{1}{2}$ inches in thickness, the same to be laid on battens, to admit of drainage water passing to the well.

Where a double bottom extends through the engine and boiler space, a *well* should be formed between the engine-room after bulkhead and the floor immediately before the same, for the drainage of water, or *open* gutter ways of sufficient size should be made in the wings, so as to be always accessible.

All loose ceiling on double bottoms to be removed when the tanks are required by the rules to be tested.

It is of importance that ample provision should be made for the free passage of air from one division to another, so that it may readily find its way to the air pipes. This should be done by fitting the liners short, setting down the angle iron from the inner bottom or top of deep tank wherever necessary, and leaving otherwise a sufficient number of holes as near to the inner bottom as practicable. The air pipes should also be sufficient in number and size; and, wherever necessary, one should be fitted at each end of each tank on both sides of the vessel.

No class will be assigned to vessels having a double bottom, or part double bottom, unless such double bottom, or part double bottom, be constructed in accordance with the requirements of the Rules, or of strength equal to that prescribed thereby.

For record of double bottoms, &c., in the Register Book, *see* the Key to the Register in the Appendix to the Rules.

DOUBLE BOTTOMS FORMED WITH GIRDERS ON TOP OF ORDINARY FLOORS.

Where double bottoms are fitted with longitudinal girders extending on top of ordinary floors, the inner or second bottom must be efficiently constructed and made water-tight; the plating of it not to be less than five-sixteenths of an inch in thickness where the vessel's number is under 11,000; if of that number or above, it is to be six-sixteenths of an inch in thickness, and the flange or side plate in each instance must be one-sixteenth of an inch thicker. The double bottom to be efficiently connected to the outside plating and frames of the main body of the vessel; and when reversed frames are cut, they must be compensated for by doubling the frames with short angle irons of their own size. The butts of the flange-plate to be double riveted; the butts and edges of the remaining plates may be single riveted.

Where double bottoms are fitted in the fore and after-holds, and not extended through the engine-room, great care should be taken to provide against an abrupt termination in the longitudinal girders; they are either to be carried through the engine-room, or fully compensated for, by connection with the longitudinal engine and boiler bearers, or otherwise, to the satisfaction of the Surveyor. *The longitudinal girders should be connected to double reversed angle irons on the floors.*

Where double bottoms, or part double bottoms, are fitted with longitudinal girders on the floors, all the outside plating (except the garboard strakes) which is entirely within the boundary of them, may be one-sixteenth of an inch less in thickness than that prescribed in table G 1, provided that thickness be ten-sixteenths of an inch or more.

CELLULAR DOUBLE BOTTOMS.

The scantlings of the various parts of the double bottom are to be as given in Table G 6 (printed at end of this notice), and the spacing of the longitudinal girders should be from 42 inches to 54 inches, according to the size of the vessel.

In vessels whose plating number is 17,000 and under, triangular bracket plates of the thickness given in Table G 6 may be fitted at alternate frames; but under the engines solid floor plates of the same thickness, lightened by manholes and with double angle irons on the upper edge, are to be fitted at every frame, and at alternate frames under the boilers. Where the plating number exceeds 17,000, instead of bracket plates, solid floor plates lightened by manholes are to be fitted throughout the whole length of the double bottom. In all vessels where flat plate keels are adopted, and in vessels having hanging keels whose plating number is 22,000 and above, bracket plates are to be fitted to the centre girder at the intermediate frames, and in all vessels, bracket plates inside and outside the double bottom are to be fitted to the margin plate to every frame all fore and aft.

Intermediate angle irons are to be fitted for stiffening the inner bottom plating, unless the longitudinal girders are more closely spaced than given above and solid floors are fitted to alternate frames, when they may be dispensed with, if approved by the Committee.

Hanging keels, when adopted with this system of construction, are to be formed of side plates on each side of the centre girder, which is to extend down to the lower edge of keel.

The inner bottom plating to be continuous and wrought longitudinally. The butts to be shifted well clear of each other and of the butts of the longitudinal girders, and the edges to be shifted well clear of the latter.

The butts and edges of the middle line strake, all fore and aft, and also the butts of the inner bottom plating in the engine and boiler space, are in all cases to be double riveted. Where the plating number is 20,000 and under 30,000, the butts of the inner bottom plating are to be double riveted for half the vessel's length amidships. Where the plating number is 30,000, and under 38,000, the butts of the inner bottom plating, and the edges of an additional strake on each side of the middle line, are to be double riveted throughout.

The butts of the side girders and margin plate are to be double riveted; and in vessels whose plating number is under 21,000, the butts of the centre girder are to be connected by double butt straps, double riveted. When the plating number exceeds 21,000, the butts are to be treble riveted with the alternate rivets in the back row omitted. The double butt straps, in all cases, to be each not less than two-sixteenths of an inch thicker than half the thickness of the plates they connect.

The rivets in the butts and edges of the inner bottom plating and girders are to be spaced not more than four diameters apart.

Manholes are not to be cut in the centre girder, and the manholes in the side girders are to be shifted well clear of each other transversely, and of the manholes in the inner bottom plating, and also clear of all butts. The manholes in the floor plates, side girders, and inner bottom plating, are to be no larger and not more numerous than necessary to render all parts of the double bottom readily accessible. The edges of the manholes should be fairly smooth to enable them to be entered with facility.

In this system of construction, the bulkheads are to be connected to the inner bottom plating by double angle irons, of the size required for the reversed frames, and to be caulked and made watertight.

CELLULAR DOUBLE BOTTOMS HAVING CONTINUOUS FLOORS FROM CENTRE GIRDER TO MARGIN PLATE.

When double bottoms are constructed with solid floor plates lightened with manholes fitted to every frame and continuous in one length from the middle line to the margin plate, the scantlings are to be as given in Table G 6, and intercostal plates are to be fitted about midway between the centre girder and margin plate, and well connected to the floors and to the inner and outer bottom plating.

In this system of construction the outside plating (except the garboard strakes and flat keel plates) which is entirely within the boundary of the double bottom, may be reduced as hitherto admitted in double bottoms.

Any other plan of fitting double bottoms may be adopted, provided in the first instance it receives the approval of the Committee.

ENGINE SPACE.

Section 26, *page* 80, *paragraph* 2.—The second sentence in this paragraph to read as follows:—

"The after floor plates should also be extended well above the screw shaft, and the after lengths of outside plating attached to the stern frame should be of not less thickness than the plates in the same range amidships. More than usual care should be bestowed in ensuring sound riveting and workmanship at this part; and it is recommended that the after frames be sufficiently apart transversely to admit of this being effected."

RUDDER.

Section 36, *page* 84.—This section made to conform to Section 5, as follows :—

"They should be spaced not more than from 4 feet to 5 feet 6 inches."

PUMPS.

Section 38, *page* 84.—The following addition is made :—

"A doubling plate should be fitted under all sounding pipes."

EQUIPMENT.

Section 39, *page* 85.—As some misapprehension exists as to the correct interpretation of paragraph 5 of this section, in regard to the number for regulating the equipment of awning-decked vessels, the latter part of this paragraph, after the words "three-decked vessel," has been amended so as to read as follows :—

"and for a spar-decked vessel, awning-decked vessel, or a vessel having a continuous shade deck, the measurements of depth and girth are to be taken to the top of the spar, awning, or shade deck beams as the case may be."

THREE-DECKED STEAM VESSELS.

Section 41, *page* 89.—The following amendment is made to the 3rd paragraph from bottom, to make it conform with Section 20 :—

"and of *not less than* three strakes of plating at the bilge, &c."

SPAR-DECKED STEAM VESSELS.

Section 42, *page* 90.—The same alteration is made in the 7th paragraph of this section :—

"and of *not less than* three strakes of plating, &c."

The following footnote is added to this section :—

"Where the height between the main and spar decks is eight feet or above at any part, additional transverse strength will be required to the satisfaction of the Committee."

AWNING-DECKED VESSELS.

Section 43, *page* 91.—The words "or upper," in the 2nd and 5th lines of the 1st paragraph, are left out in order to render the definition more distinct.

The 2nd paragraph is amended as follows :

"The plans of such vessels and a minimum freeboard must be submitted to the Committee for approval, and the freeboard thus sanctioned," &c.

Section 43, *paragraph* 3.—The following alteration is made in this paragraph :—

"Awning-decked vessels loading to a greater draught of water than *thus indicated* will thereby lose their character in the Register Book."

RAISED QUARTER DECKS.

Section 45, *page* 93.—The following typographical error in the 3rd paragraph corrected :—

"the tin" should read as follows, "*then it.*"

TABLE G 1.

* Table G 1 has been altered as shown thereon in Red in the accompanying Table, dated 26th April, 1883.

The following foot-note is added at foot of pages 8, 48, 55, 58, 105, 135, and 142 of the Society's Rules :—

N.B.—In reference to the rules above quoted, and in order to prevent the disappointment arising from ships losing their Characters from want of survey, it is hereby intimated that the duty of giving NOTICE OF PERIODICAL SURVEYS required by the Rules, or when repairs are necessary in consequence of damage, or from other causes, rests with the Owners, Masters, or Agents.

TABLE G 6.

TABLE OF SCANTLINGS FOR DOUBLE BOTTOMS CONSTRUCTED ON THE CELLULAR SYSTEM.

PLATING NUMBER FOR REGULATING SCANTLINGS.	Centre Girder. — Depth above Top of Keel and Thickness.	Thickness of Side Girders.	Margin Plate. — Depth (exclusive of Flange) and Thickness.	Thickness of Inner Bottom Plating. Middle Line Strake.	In Engine and Boiler Space.	In Holds.	Thickness of Bracket or Floor Plates.	DIMENSIONS OF ANGLE IRONS. On Centre Girder.	On Margin Plates.	On Side Girders Intermediate, and Vertical Angle Irons.
—— under 11,000	32 × 8/16	5/16	18 × 6/16	6/16	6/16	5/16	5/16	3½ × 3½ × 7/16	3 × 3 × 6/16	3 × 2½ × 5/16
11,000 & under 13,000	33 × 8/16	6/16	19 × 7/16	7/16	7/16	6/16	6/16	3½ × 3½ × 7/16	3½ × 3½ × 7/16	3 × 2½ × 6/16
13,000 „ 15,000	34 × 8/16	6/16	20 × 7/16	7/16	7/16	6/16	6/16	3½ × 3½ × 7/16	3½ × 3½ × 7/16	3 × 3 × 6/16
15,000 „ 18,000	35 × 9/16	6/16	21 × 7/16	8/16	7/16	6/16	6/16	4 × 4 × 8/16	3½ × 3½ × 7/16	3 × 3 × 6/16
18,000 „ 21,000	36 × 9/16	6/16	22 × 7/16	8/16	7/16	6/16	6/16	4 × 4 × 9/16	3½ × 3½ × 7/16	3 × 3 × 7/16
21,000 „ 24,000	38 × 10/16	6/16	24 × 7/16	9/16	7/16	6/16	6/16	4 × 4 × 9/16	3½ × 3½ × 8/16	3½ × 3½ × 7/16
24,000 „ 28,000	40 × 10/16	7/16	26 × 7/16	9/16	7/16	6/16	7/16	4 × 4 × 9/16	3½ × 3½ × 8/16	3½ × 3½ × 7/16
28,000 „ 33,000	42 × 10/16	7/16	28 × 8/16	9/16	8/16	7/16	7/16	4 × 4 × 9/16	4 × 4 × 8/16	3½ × 3½ × 7/16
33,000 „ 38,000	44 × 10/16	7/16	30 × 8/16	10/16	8/16	7/16	7/16	4 × 4 × 9/16	4 × 4 × 8/16	3½ × 3½ × 8/16

By order of the Committee,

BERNARD WAYMOUTH,

Secretary.

No. 2, White Lion Court, Cornhill, London, E.C.
26th April, 1883.

* The Table as altered is now bound up with this Edition of the Rules, 1*st July*, 1883.

No. 504.

LLOYD'S REGISTER OF BRITISH AND FOREIGN SHIPPING.

ALTERATIONS AND AMENDMENTS MADE IN THE RULES OF THE SOCIETY BY THE GENERAL COMMITTEE.

Alterations have been made in the Rules of the Society in the following sections thereof, viz., in

SUPERINTENDENCE OF THE AFFAIRS OF THE SOCIETY.

Sections 8 and 10 of the Rules, page 2, have been altered, and will read as follows, viz. :—

Section 8.—The superintendence of the affairs of the Society to be under the direction of a Committee of Merchants, Shipowners, and Underwriters: twenty-four elected in London and twenty-four at the principal Outports, and, in addition, the Chairman for managing the affairs of Lloyd's, and the Chairman of the General Shipowners' Society, for the time being, to be *ex-officio* members of the Committee, but any member (except an ex-officio member) who fails to attend any meetings of the Committee for a period of six continuous months, without leave of absence, shall cease to be a member, and his place shall be filled up in the usual way. The General Committee reserve the right of varying or withdrawing the representation of Outports, as well as the mode of election of members.

Section 10.—Of the members elected at the Outports twenty are to retire at the end of every *four* years, and four of the members elected at Liverpool are to retire annually. The retiring members are eligible for re-election.

FEES IN LIEU OF THE PRESENT SCALE OF FEES.

Section 27, *page* 4.—The following Fees to be charged to the Owners of Ships prior to their vessels being classed and registered in the book:—

I.

CLASSING FEES.

For First Entry of Class in the Register Book, or for Recording Continuation or Restoration, or A in Red, or Special Survey No. 3.

For each Ship under 200 tons	£1	0 0
Ditto of 200 and under 500 tons	2	0 0
Ditto of 500 „ 1000 „	3	0 0
Ditto of 1000 „ 2000 „	4	0 0
Ditto of 2000 and upwards	5	0 0

For First Entry of the Notification "L.M.C." in the Register Book.

For each Ship under 100 registered HP.	...	...	...	£1	0 0
Ditto of 100 and under 300 HP.	...	...	...	2	0 0
Ditto of 300 and above	...	...	...	3	0 0

II.

OFFICE OR REGISTRATION FEES.

Chargeable on Vessels surveyed, for other than First Entry, &c., under the above Scale 1, *by the Society's Non-Exclusive Surveyors.*

For each Ship under 500 tons ...	...	...	...	£0	10 0
Ditto of 500 and under 1000 tons	...	...	...	1	0 0
Ditto of 1000 „ 2000 „	...	...	...	1	10 0
Ditto of 2000 and upwards	...	...	...	2	0 0

IRON SHIPS.

SPAR-DECKED STEAM VESSELS.

Section 42, *page* 90.—The following paragraphs, and footnote thereto, to be substituted for paragraph 1 of this Section :—

"Vessels noted in the Register Book as 'Spar Deck' are those which are of lighter construction* than vessels built under the Three-decked rule, having the same dimensions taken with reference to the total depth to the spar or upper deck in either case. They must have three tiers of beams, and be not less than 15 feet depth of hold to the main deck. The Committee, however, will approve of the construction of spar-deck vessels having a less depth of hold, provided the plans be in the first instance submitted for approval. For such vessels having less than 15 feet depth of hold a minimum freeboard must also be submitted to the Committee for approval, and the freeboard sanctioned is to be inserted in the Certificate and in the Register Book, and marked on the ship's sides.

In cases where erections are required on the spar-deck, plans must be submitted showing the additional strengthening proposed, which must be to the satisfaction of the Committee.

* This does not necessarily imply that the vessel is of less strength in relation to the amount of dead weight carried at a suitable load-line.

SHIPS BUILT OF STEEL.

The footnote to the Notice No. 436* respecting ships built of steel has been amended, and will stand as follows, viz.—

* The rivets, keel, stem, sternpost, rudder and pillars, the girders and top of double bottoms fitted on ordinary floors, coal bunker bulkheads, casings round engines, hatchway comings, poops, forecastles, and deck erections, may be of Iron of the usual size, but no other parts of such ships are to be of Iron without the special sanction of the Committee. When other parts are admitted of Iron, the same will be denoted in the Register Book.

SPARE GEAR FOR STEAM SHIPS.

Section 39, *page* 88 of the Rules for Iron Vessels—and corresponding Sections in the Rules for Wood and Composite Ships.—After the words "one set of piston springs" in the section referring to machinery, the words "where common springs are used" to be added.

RULES FOR THE STRENGTH OF BOILERS.

Circular 419, *page* 157 *of the Rules.*—In order to simplify the Rules as to rivets in the shells, the wording to read as follows:—

For rivets at joint, $B = \frac{n \times a}{p \times T} \times 100$ with iron rivets in iron plates, with punched holes.

$B = \frac{n \times a}{p \times T} \times 90$ with iron rivets in iron plates, with drilled holes.

$B = \frac{n \times a}{p \times T} \times 85$ with steel rivets in steel plates.

$B = \frac{n \times a}{p \times T} \times 70$ with iron rivets in steel plates.

The footnote as to rivets in steel boilers to be omitted.

CIRCULAR FURNACES.

Page 159 *of the Rules.*—The following addition to be made in regard to the strength of corrugated furnaces:—

"The strength of corrugated furnaces (corrugations $1\frac{1}{2}$ inches deep) to be calculated according to the following formula"—

$$\frac{1000 \times (T - 2)}{D} = \text{working pressure,}$$

where T = thickness of plates in sixteenths of an inch,

D = greatest diameter of furnace in inches.

By Order of the Committee,

BERNARD WAYMOUTH,

No. 2, White Lion Court, Cornhill, London, E.C. *Secretary.*

7th June, 1883.

KEY TO THE REGISTER.

THE Equipment of vessels is designated by the Figure 1, and by a line thus —

The figure 1, signifying that the vessel is well and sufficiently found.

The line — that she is deficient in either quantity or quality.

Defects or inefficiency in engines or boilers of a Steam Ship sufficient to imperil the vessel's safety are indicated by a *red* ring over the figure 1.

Defects or inefficiency in masts or rigging of a Sailing Ship sufficient to imperil the vessel's safety are indicated by a *black* ring over the figure 1.

Vessels RESTORED to, or CONTINUED on, the Character A, will have the number of years for which they are Restored or Continued, with the name of the Port of Survey, inserted separately under the number originally assigned, in the twelfth column; thus—Rest.Lon.80-5yrs, or Cont.Liv.80-3yrs. Where the term in the case of Continuation has expired, the letter "C" only will be placed before the figure denoting the number of Years for which Continuation had been allowed; thus—C 3.

Vessels opened as required by the Rules, will be marked in the Register "S.S." with the number of years that may elapse before they are again opened, and the year of survey; thus—"S.S.Cly.80-4yrs." (*See* Section 61.)

Vessels marked "S.S." with a date, *in red*, denote that they have been surveyed at that time in accordance with the Rules, Section 60; thus—"S.S.Sld.80-5yrs" (in red ink).

The mark [*B.S.*] denotes that the vessel is classed subject to *Biennial Survey*. The mark [*Expl. B.S.*] denotes that the vessel is built *Experimentally*, and classed subject to *Biennial Survey*. (*See* Section 31.)

The mark *t.s.* with a date, denotes that the vessel has been submitted to Triennial Survey as prescribed by Rules for Iron Ships; thus, *t.s.* 80.

The marks *s.s.*Nwc.*No.*1-80 — *s.s.*Hul.*No.*2-80 — *s.s.*Lon.*No.*3-80 denote that the vessels have been submitted to periodical surveys, as prescribed in the Rules for Iron Ships.

The initials H.T. (*Half-time*) with the date of Survey prefixed, thus—H.T.Lon.80, denote that the Half-time or intermediate Survey required by the Rule, Section 34, has been held.

The figures in the thirteenth column, to vessels in the classes A in red, Æ or E class, imply that they were originally classed A, for that number of years. The cipher 0 in this column indicates that (from inferior construction) there were NO "number of Years first assigned."

The broad A signifies that the vessel is built of Iron.

The note * prefixed to A, thus—*A, signifies that the vessel has been built with heavier plating than the Rules *now* require.

Ships built under Special Survey as per Section 35 of the Society's Rules will be shown by a cross; thus, ✠. (*See* Section 28.)

KEY TO THE REGISTER — *continued.*

In the Second Column.

Bk .....Barque	G .....Galliot	Scw.....Screw	Sr .....Schooner
Bkn.....Barquentine	H .....Hoy	Sk .....Smack	St .....Schoot
Bg .....Brig	K .....Ketch	Sp .....Sloop	Stm.....Steamer
Bn .....Brigantine	Lr .....Lugger	Sq ... { Square Rigged	Sw .....Snow
Cr .....Cutter	Pol .....Polacre		Yt .....Yacht
Dr .....Dogger	S.....Ship		

pt.—*Part.* s.—*Sheathed.* d.—*Doubled.* C.—*Coppered.* Y.M.—*Yellow Metalled.* U.M.—*Sheathed with Union Metal.* *Z.—Sheathed with Zinc.* F.—*Felt.* lm.—*Light water-mark.* I.B.—*Iron Bolts.* G.I.B.—*Galvanized Iron Bolts.* c.f.—*Copper or Yellow Metal fastened in accordance with paragraph No.* 1 *in Section* 46 *of the Rules.* C.F.—*Copper or Yellow Metal fastened in accordance with paragraph No.* 2 *in Section* 46 *of the Rules. Also for Copper or Yellow Metal fastenings of Composite Ships, in accordance with paragraph No.* 1, *see page* 129. **C.F.**—*Copper or Yellow Metal fastenings of Composite Ships in accordance with paragraph No.* 2, *page* 129. C.T.—*Copper or Yellow Metal fastened in accordance with paragraph No.* 3 *in Section* 46 *of the Rules.* Cem.—*Cemented.* Asp.—*Asphalted.* *B.Hds.—Bulkheads.*

In the Third Column.

The note † after the word *Salted* (thus—*Salted*†) signifies that the vessel's beams are *not* salted.

In the Fifth Column.

2 or 3 *Dks.—Two, or three Decks laid.* 2 or 3 *tr B.—Two, or three tiers of Beams with or without Decks on them.* 3 *Dk-Rule.—According to the Rules for three decks, Section* 41. *Spar dk.—According to the Rules for Spar deck, Section* 42. *Awning dk.—According to the Rules for Awning decks, Section* 43. *F.D.—Flush deck.* *R.Q.D.*30 *ft.—Raised quarter deck* 30 *feet long.* *B.D.*30 *ft.—Bridge deck* 30 *feet long.* *P.*30 *ft.—Poop* 30 *feet long.* *F.*30 *ft.—Forecastle* 30 *feet long.* *Brk.—Break.*

In the Seventh Column.

The Timber of which vessels are built is marked by the following Italic Letters:—

A .....Ash	*G* .....Gum	*LO*.....Live Oak	*S* .....Spruce
BB.....Black Birch	*Ght* .....Greenheart	*M* .....Mahogany	*Sb* .....Sabicu
Bh.....Beech	*Hk*.....Hackmatack	*O*.....Oak	*Sl* .....Saul
C .....Cedar	*Hm*.....Hemlock	*P*.....Pine	*T*.....Teak
Chs.....Chestnut	*J* .....Juniper	*PP*.....Pitch Pine	*Tam*.....Tamarac
E .....Elm	*L*.....Locust	*RP*.....Red Pine	*WH*.....Witch Hazel
F .....Fir	*Lh* .....Larch	*YP*.....Yellow Pine	*WO* .....White Oak

For Steam Ships, HP. with figures prefixed—*the Horse Power,* when stated, is taken from the Ship's Register, but is of course no indication of the real power. *The figures after* Cy. *represent Diameter of Cylinders and length of stroke in inches. Figures before* lb. *the Boiler pressure in pounds per square inch.* C.—*Compound.* I.—*Inverted.* H.—*Horizontal.* O.—*Oscillating.* D.—*Diagonal.* L.—*Lever.* NE.&B.—*New Engines and Boilers.* MC.—*Machinery Certified by Makers.* L.MC. (*in red*)—*Machinery Certified by the Engineer-Surveyors to Lloyd's Register* (*see* the Rules for Machinery of Steam Ships). B.&M.S. (*in red*)—*Boiler and Machinery Surveyed and Reported to be satisfactory by the Engineer-Surveyors to Lloyd's Register.* ✠ (*in red*) *indicates Special Survey of Machinery during construction, thus* ✠L.MC.; *or Special Survey of Engines and Boilers, during construction, thus* ✠NE.&B. lrp. (*in red*)—*Large repairs.* drp. (*in red*)—*Damage repairs, of Machinery.*

Cl.—*Clincher.* len.—*Lengthened.* lrp.—*Large repairs.* srp.—*Some repairs.* drp.—*Damage repaired.* ND.—*New Deck.* NTsds.—*New Top-Sides.* w.s.—*Wales sheathed.* NW.—*New Wales.* NB.—*New Bottom.* NKl.—*New Keel.* retrld.—*Retreenailed.* plk.—*Plank.* NKlsn.—*New Keelson.* alm.rb.—*almost rebuilt.* ptOM.—*part Old Materials.* Mat.—*Materials.*

KEY TO THE REGISTER — *continued.*

Illustrations of notations *in the Tenth Column* of the Register Book, in regard to Double Bottoms and Water Ballast Tanks.

*D.B.*70 *ft.*80 *tons: denoting Double Bottom* 70 *feet long; capacity,* 80 *tons.*

*D.B.a.*58 *ft.f.*40 *ft.*180 *tons: denoting Double Bottom, aft* 58 *feet, forward* 40 *feet long; capacity,* 180 *tons.*

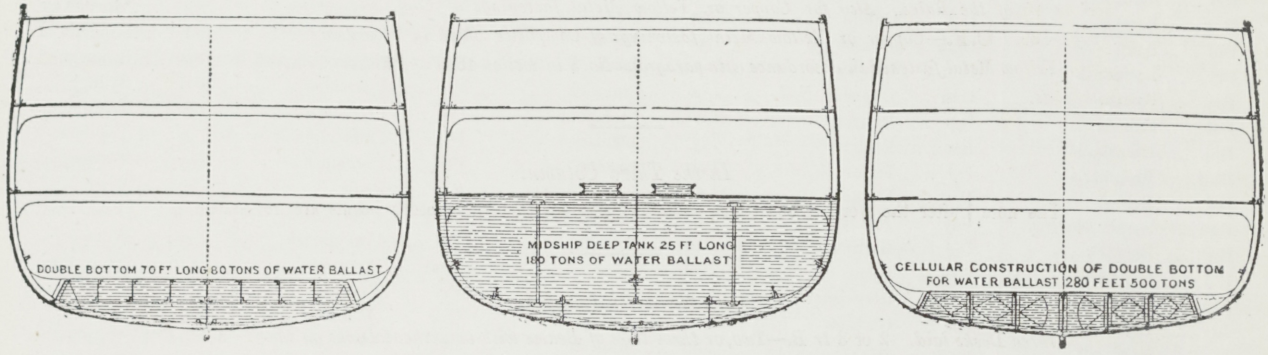
*D.B.a.*72 *ft. and under E.& B.*28 *ft.*260 *tons: denoting Double Bottom aft* 72 *feet long, and under Engines and Boilers* 28 *feet long; capacity,* 260 *tons.*

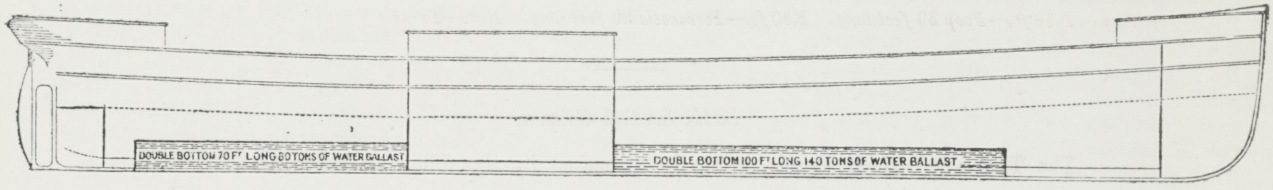
*Cell.D.B.*280 *ft.*500 *tons: denoting Cellular construction of Double Bottom* 280 *feet long; capacity,* 500 *tons.*

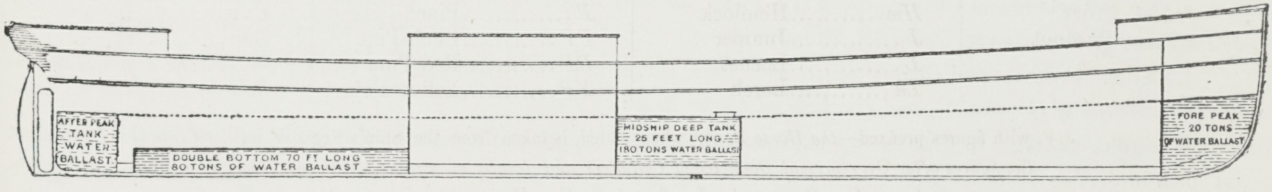
*F.P.T.*20 *tons: denoting Fore Peak Tank; capacity,* 20 *tons.*

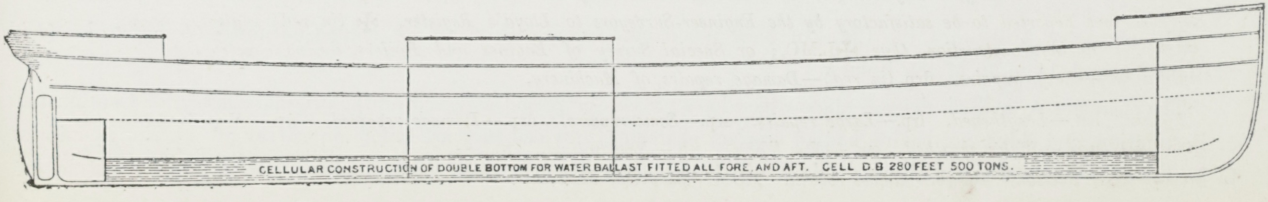
*A.P.T.*8 *tons: denoting After Peak Tank; capacity,* 8 *tons.*

*M.T.*25 *ft.*180 *tons: denoting Midship deep Tank,* 25 *feet long; capacity,* 180 *tons.* (*See* Diagrams.)









KEY TO THE REGISTER — *continued.*

In the Twelfth Column (Surveying Ports):—

Abn.....Aberdeen
Abr.....Aberayron
Abs .....Aberystwith
Adl .....Adelaide
All .....Alloa
Amy.....Amoy
Ams.....Amsterdam
Ant .....Antwerp
Apl .....Appledore
Arb .....Arbroath
Auk.....Auckland, N.Z.
Bal .....Baltimore
Bng.....Bangor
Bnf .....Banff
Bar .....Barmouth
Brw.....Barrow
Bat .....Batavia
Bpl .....Barnstaple
Bms.....Beaumaris
Bel .....Belfast
Bgn.....Bergen, Norway
Bwk.....Berwick
Bid .....Bideford
Blg .....Belgium
Bly .....Blyth
Bdx .....Bordeaux
Bos .....Boston
Bhn.....Bremerhaven
Bdg .....Bridgwater
Bpt .....Bridport
Brs .....Bristol
Bsb .....Brisbane
Bxm.....Brixham
Cal .....Calcutta
CTn .....Cape Town
Car .....Cardigan
Cff .....Cardiff
Chp .....Chepstow
Chs .....Chester
Cch .....Christchurch
Cly ... { Clyde / Glasgow, &c.
Cpn .....Copenhagen
Crk .....Cork
Cws.....Cowes
Dem.....Demerara
Dov.....Dover
Drt .....Dartmouth
Dub.....Dublin
Dmb. ...Dumbarton
Dun.....Dundee
Ddn.....Dunedin, N.Z.
Dgr .....Dungarvon
Exr .....Exeter
Fal .....Falmouth
Fiu .....Fiume
Foy .....Fowey
Gal .....Galway
Gen .....Genoa
Glr .....Gloucester
Gls .....Glasgow
Gmh ...Grangemouth
Gms.....Grimsby
Gns .....Guernsey
Goo .....Goole
Got .....Gothenburg
Grk .....Greenock
Gro .....Groningen
Ham.....Hamburg
Hav .....Havre
Hrl .....Harlingen
Hgt.....Harrington
Hpl .....Hartlepool
Har .....Harwich
Hay.....Hayle
Hbt .....Hobart
Hol .....Holland
HKg ...Hong Kong
Hgz.....Hoogezand
Hul .....Hull
Inv .....Inverness
Ips .....Ipswich
I.M.....Isle of Man
Jer .....Jersey
Lan .....Lancaster
Lgn .....Leghorn
Lth .....Leith
Lim .....Limerick
Liv .....Liverpool
Lly .....Llanelly
Lon .....London
Ldy .....Londonderry
Lwt .....Lowestoft
Lus .....Lussino
Lyn .....Lynn
Mlt .....Malta
Man.....Manila
Mar .....Margate
Msl .....Marseilles
Mpt.....Maryport
Mau.....Mauritius
Mel .....Melbourne
Mil .....Milford
Mch.....Miramichi
Mth.....Monmouth
Mtr .....Montrose
Nts .....Nantes
Nap .....Naples
Nwc.....Newcastle
Nhv.....Newhaven
Npt .....Newport
Nqy... { Newquay, Cardiganshire
Nry .....Newry
N.Yk ...New York
Ndp.....Nieuwe Diep
NSc.....Nova Scotia
Ork .....Orkneys
P.E.I. { Prince Edward Island
Pad .....Padstow
Pka .....Pekela
Pnz .....Penzance
Pet .....Peterhead
Phl .....Philadelphia
Ply .....Plymouth
Poo .....Poole
P.Nl.....Port Natal
Pts .....Portsmouth
Pmd ...Portmadoc
Prs .....Preston
Qbc.....Quebec
Ram.....Ramsgate
Ros .....Rostock
Rot .....Rotterdam
Rou.....Rouen
S.Fo.....San Francisco
St. I. ...St. Ives
St. J. ...St. John
St. M. ...St. Malo
Spr .....Sappemeer
Scr .....Scarborough
Shi. .....Shanghai
Sil .....Scilly
Shl ... { Shields, N. / Shields, S.
Shm.....Shoreham
Sng .....Singapore
Sly .....Sicily
Sli .....Sligo
Sba .....Sourabaya
Sou .....Southampton
Stk .....Stockton
Str .....Stranraer
Stn .....Stornoway
Sld .....Sunderland
Sws .....Swansea
Syd .....Sydney
Tgn .....Teignmouth
Tps .....Topsham
Tqy .....Torquay
Tri .....Trieste
Vdm.....Veendam
Ven .....Venice
Wtf.....Waterford
Wln.....Wellington
Wls .....Wells
Wex.....Wexford
Wey.....Weymouth
Wtb ...Whitby
Whn ...Whitehaven
Wbl ...Whitstable
Wlv.....Wildervank
Wrk ...Workington
Yar .....Yarmouth
Ygh .....Youghal
Zwl .....Zwolle

ANCHORS AND CHAIN CABLES.

A.&C.P.—Anchors and Chains proved at a *Public Machine recognised by the Committee of Lloyd's Register and licensed by the Board of Trade.*—(*See Table No.* 22 *in the Rules.*)

L.A.&C.P.—Anchors and Chains which have been tested at those Establishments *which are under the Superintendence of the Committee of this Society, and also licensed by the Board of Trade.*

Anchors and Chain Cables manufactured abroad and supplied to *foreign owned vessels* will, under the conditions set forth in Section 72 of the Rules, be accepted for the figure 1 in classification, but, in these cases, the record of A.&C.P. will not be made in the Register Book.

In the Fourteenth Column.

The character A denotes the Class of New Wood and Composite Ships, or ships Continued, or Restored. (*Vide* Sections 34, and 54 to 59 of the Rules.)

The character A, in Red, denotes ships which have passed the period assigned on the original Survey, or Continuation, or Restoration, and ships, not having had an original character, provided they are found on survey of superior description, fit for the conveyance of dry and perishable goods, *to and from all parts of the world.* (*Vide* Section 60 of the Rules.)

The character Æ denotes ships which have been found on Survey fit for the safe conveyance of dry and perishable goods on *shorter voyages,* and for the conveyance of cargoes *not* in their nature subject to sea damage on *any voyage.* (*Vide* Section 61 of the Rules.)

The character E denotes ships which have been found on Survey fit for the conveyance of cargoes not in their nature subject to sea damage *on any voyage.* (*Vide* Section 64 of the Rules.)

The Figures under a Character denote the date when the vessel was last surveyed.

When printed in Red (except in the case of Vessels classed A 1 *in Red), they indicate that the Survey has reference to the Stores only.*

FOREIGN BUILT SHIPS.—CLASSED **F.** (*Vide* Section 83 of the Rules.)

The character **1 F** denotes ships which have been found on survey to be of a superior description, fit for the conveyance of dry and perishable goods to and from all parts of the world.

The character **2 F** denotes ships which, although not equal to the foregoing, have nevertheless been found on survey to be in a good and efficient condition, and fit for the conveyance of dry and perishable goods, on shorter voyages.

The twelfth, thirteenth, and fourteenth Columns left blank, indicate that the Vessel has never been Classed in the Register Book. In Column 13 *three dots* ... *indicate that the Vessel was at one time Classed by this Society, but that the Class has been withdrawn at owner's request. In Column* 14 *a black line with date under it (thus* $\overline{3,82}$*) indicates that, at that date, the Vessel,* from reported defects, *was not entitled to a Character in the Register Book. A red line with date under it indicates that the Class was withdrawn from non-compliance, at that date, with the Society's Rules. The broad* A *that the Vessel is built of Iron. The note* * *(thus* *A*) *that the Vessel has been built with heavier plating than the Rules now require. A ring, in red, over the figure* 1 *indicates defects in engines or boilers of a Steam Ship imperilling the Ship's safety; a ring, in black, over the figure* 1 *indicates defects in masts or rigging of a Sailing Ship imperilling the Ship's safety.*

When the fourteenth column is left blank except as regards the date of Survey last recorded, it indicates that the Character has expired or been withdrawn from absence of Survey, or on account of non-payment of fee due in the case.

EXPIRATION OF CLASS OF WOOD SHIPS.—EXTRACT FROM SECTION 59 OF THE RULES.

* The terms of years assigned to ships on the Character A, launched *previously to the* 1*st July,* 1859, also of ships launched during the *first* six months of the years 1860, 1861, 1862, and 1863, will expire on the 31st December of the last year of the periods assigned to them respectively.

The terms assigned to ships launched during the *last* six months of the years 1859, 1860, 1861, and 1862, will expire on the 30th June next after the last year of the periods assigned to them respectively.

In the case of ships launched on and after the 1st July, 1863, the period originally assigned to them on the A 1 character, will in every case *date from the month* in which the vessel may be launched, and will expire at the end of the corresponding month in the year at which the period assigned terminates.

STATEMENT of the Number, Tonnage, and Description of New Vessels built in the United Kingdom and Registered therein during the year 1882.

1882.	STEEL.				IRON.				WOOD.			
	STEAM.		SAILING.		STEAM.		SAILING.		STEAM.		SAILING.	
	NO.	TONS. (GROSS).	NO.	TONS. (GROSS).	NO.	TONS. (GROSS).	NO.	TONS. (GROSS).	NO.	TONS. (GROSS).	NO.	TONS. (GROSS.)
JANUARY	3	5,099	...	.....	19	28,658	7	7,338	2	142	10	797
FEBRUARY	4	14,088	1	1,361	33	46,183	6	6,762	1	68	10	664
MARCH	3	8,200	1	2,347	32	58,495	9	8,114	2	33	28	1,430
APRIL	6	15,491	...	.....	41	56,424	6	6,784	2	80	24	1,373
MAY	4	8,697	1	2,322	41	66,107	6	9,548	3	165	21	1,057
JUNE	6	11,087	1	102	32	48,059	3	4,440	3	149	26	1,271
JULY	7	8,028	...	.....	36	52,248	7	11,096	2	25	36	1,821
AUGUST	8	5,512	1	1,584	49	78,550	7	12,680	7	491	19	946
SEPTEMBER	3	4,917	...	.....	41	64,369	10	15,381	2	267	19	933
OCTOBER	5	9,566	1	1,374	38	52,490	3	4,916	3	268	19	1,132
NOVEMBER.....	6	6,848	2	3,388	44	57,311	5	8,223	1	32	25	922
DECEMBER.....	10	17,916	...	.....	40	63,846	14	17,570	2	64	9	720
	65	115,449	8	12,478	446	672,740	83	112,852	30	1,784	246	13,066

SUMMARY.

	STEEL.		IRON.		WOOD.		TOTAL.	
STEAM VESSELS.....	65	115,449	446	672,740	30	1,784	541	789,973
SAILING VESSELS...	8	12,478	83	112,852	246	13,066	337	138,396
TOTAL	73	127,927	529	785,592	276	14,850	878	928,369

Total Number of New Vessels built in the United Kingdom and Registered therein during the year 1882:—

878 *VESSELS OF* **928,369** *TONS.*

The above Statements show that while there were **118** *more Vessels lost*, &c., belonging to the United Kingdom, than

LLOYD'S REGISTER OF SHIPPING,
18*th January*, 1883.

STATEMENT of the Number, Tonnage, and Description of Vessels registered in the United Kingdom, which were returned as Lost, Broken up, &c., during the year 1882.

1882.	STEEL.				IRON.				WOOD.			
	STEAM.		SAILING.		STEAM.		SAILING.		STEAM.		SAILING.	
	NO.	TONS (GROSS).	NO.	TONS (GROSS).	NO.	TONS (GROSS).	NO.	TONS (GROSS).	NO.	TONS (GROSS).	NO.	TONS (GROSS).
JANUARY	...	.....	...	.....	26	28,426	3	2,979	...	.....	88	24,770
FEBRUARY	...	.....	...	.....	11	9,510	6	6,879	3	238	69	15,049
MARCH	...	.....	...	.....	10	8,342	...	.....	1	81	79	15,920
APRIL	...	.....	...	.....	11	15,192	5	6,410	...	.....	45	13,264
MAY	...	.....	...	.....	15	15,999	4	4,115	6	957	92	12,612
JUNE	...	.....	...	.....	9	8,613	1	1,503	1	65	45	6,515
JULY	...	.....	...	.....	8	10,240	4	3,354	4	388	40	10,336
AUGUST	...	.....	...	.....	14	16,464	2	2,337	...	.....	35	13,509
SEPTEMBER	...	.....	...	.....	9	6,890	1	999	1	28	31	5,164
OCTOBER	...	.....	...	.....	14	15,376	5	4,284	1	82	57	15,606
NOVEMBER	...	.....	...	.....	16	12,556	5	4,373	2	329	91	13,885
DECEMBER	...	.....	...	.....	15	13,135	9	8,920	5	348	97	17,663
	...	.....	...	.....	158	160,743	45	46,153	24	2,516	769	164,293

SUMMARY.

	STEEL.		IRON.		WOOD.		TOTAL.	
STEAM VESSELS.....	...	.....	158	160,743	24	2,516	182	163,259
SAILING VESSELS...	...	.....	45	46,153	769	164,293	814	210,446
TOTAL	...	.....	203	206,896	793	166,809	996	373,705

Total Number of Vessels, registered in the United Kingdom, returned as Lost, Broken up, &c., during the year 1882:—

996 *VESSELS OF* **373,705** *TONS.*

were built therein, and *registered* during the year 1882, the *tonnage of those built* exceeded that of those lost by **554,664** tons.

STATEMENT showing the Number, Tonnage, and Description of New Vessels classed by Lloyd's Register of British and Foreign Shipping during the year 1882.

WHERE BUILT.	STEEL.				IRON.				WOOD.				TOTAL.	
	STEAM.		SAILING.		STEAM.		SAILING.		STEAM.		SAILING.			
	NO.	TONS.	NO.	TONS.	NO.	TONS.	NO.	TONS.	NO.	TONS.	NO.	TONS.	NO.	TONS.
United Kingdom	50	105,441	8	12,477	432	714,489	67	107,745	11	945	65	5,250	633	946,347
Colonies	...	.....	...	.....	...	.....	...	.....	...	.....	14	5,470	14	5,470
United States ..	...	.....	...	.....	4	8,452	...	.....	...	.....	...	.....	4	8,452
Germany	...	.....	...	.....	10	10,715	1	1,086	...	.....	3	266	14	12,067
Austria	2	5,475	...	.....	1	2,649	...	.....	...	.....	...	.....	3	8,124
Italy	...	.....	...	.....	2	129	...	.....	...	.....	...	.....	2	129
Holland	1	1,504	...	.....	2	483	...	.....	...	.....	...	.....	3	1,987
Denmark	...	.....	...	.....	3	3,638	...	.....	...	.....	...	.....	3	3,638
Norway	...	.....	...	.....	3	1,689	...	.....	...	.....	...	.....	3	1,689
Sweden	2	944	...	.....	...	.....	...	.....	1	155	...	.....	3	1,099
	55	113,364	8	12,477	457	742,244	68	108,831	12	1,100	82	10,986	682	989,002

SUMMARY.

	STEEL.		IRON.		WOOD.		TOTAL.	
STEAM VESSELS ...	55	113,364	457	742,244	12	1,100	524	856,708
SAILING VESSELS...	8	12,477	68	108,831	82	10,986	158	132,294
Total	63	125,841	525	851,075	94	12,086	682	989,002

Total Number of NEW VESSELS CLASSED by the Society during the year 1882:—

682 *VESSELS OF* **989,002** *TONS.*

Lloyd's Register of Shipping,
18*th January*, 1883.